Exam

Name_________________________________

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

1) Use series to estimate the integral's value to within an error of magnitude less than 10^{-3}. 1) _______

$$\int_0^{0.3} \ln(x^2 + 1)dx$$

A) 0.02044 B) 0.008790 C) 0.009833 D) 0.008767

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

2) $a_n = \dfrac{2n + 1}{n + 1}$ 2) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Answer the question.

3) The series below is the value of a Maclaurin series of a function f(x) at some point. What function and what point? 3) _______

$$\sum_{n=0}^{\infty} \frac{(8)^n}{n!}$$

A) e^x at x = 8 B) $\dfrac{1}{1 - x}$ at x = 8 C) $\dfrac{1}{1 + x}$ at x = 8 D) $\ln \dfrac{1 + x}{1 - x}$ at x = 8

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

4) $a_n = \dfrac{(n + 4)!}{(4n + 1)!}$ 4) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

5) $a_n = \dfrac{8^n}{(8n)!}$ 5) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Answer the question.

6) The series below is the value of a Maclaurin series of a function f(x) at some point. What function and what point? 6) _______

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\left(\frac{1}{5}\right)^n}{n}$$

A) $\ln(1 + x)$ at $x = \frac{1}{5}$ B) $\tan^{-1} x$ at $x = \frac{1}{5}$
C) $\sin x$ at $x = \frac{1}{5}$ D) $\dfrac{1}{1 + x}$ at $x = \frac{1}{5}$

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

7) $a_n = \dfrac{7^n}{7n}$ 7) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Solve the problem.

8) Use series to estimate the integral's value to within an error of magnitude less than 10^{-3}. 8) _______

$$\int_0^{0.6} \cos^2 x\, dx$$

A) 0.5330 B) 0.2984 C) 0.6834 D) 0.5991

Answer the question.

9) The series below is the value of a Maclaurin series of a function f(x) at some point. What function and what point? 9) _______

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\pi^n}{4^n \cdot n}$$

A) $\ln(1 + x)$ at $x = \frac{\pi}{4}$ B) $\tan^{-1} x$ at $x = \frac{\pi}{4}$

C) $\cos x$ at $x = \frac{\pi}{4}$ D) $\sin x$ at $x = \frac{\pi}{4}$

Solve the problem.

10) Use series to estimate the integral's value to within an error of magnitude less than 10^{-3}. 10) _______

$$\int_0^{0.4} \sqrt{1 + x^3}dx$$

A) 0.1943 B) 0.4032 C) 0.4155 D) 1.015

Answer the question.

11) Estimate the error if $\sin x^{3/2}$ is approximated by $x^{3/2} - \dfrac{x^{9/2}}{3!}$ in the integral of $\displaystyle\int_0^1 \sin x^{3/2}\, dx$. 11) _______

A) $\dfrac{6}{17 \cdot 5!}$ B) $\dfrac{1}{5!}$ C) $\dfrac{2}{17 \cdot 5!}$ D) $\dfrac{2}{15 \cdot 4!}$

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

12) $a_n = \dfrac{\tan^{-1} \frac{7}{n}}{7}$ 12) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

13) $a_n = \ln \dfrac{2n+1}{6n+1}$ 13) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Use substitution to find the Taylor series at x = 0 of the given function.

14) $\ln(1 + x^2)$ 14) _______

A) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n x^{2n}}{n}$ B) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{2n}}{(2n)!}$

C) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{2n}}{n}$ D) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} x^{2n}$

Answer the question.

15) The series below is the value of a Maclaurin series of a function f(x) at some point. What function and what point? 15) _______

$$2 \sum_{n=0}^{\infty} \frac{\left(\frac{1}{3}\right)^{2n+1}}{2n + 1}$$

A) $\tan^{-1} x$ at $x = \frac{1}{3}$ B) $\dfrac{1}{1 + x}$ at $x = \frac{1}{3}$ C) $\ln \dfrac{1 + x}{1 - x}$ at $x = \frac{1}{3}$ D) $\sin x$ at $x = \frac{1}{3}$

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

16) $a_n = \dfrac{\sin^{-1} \frac{1}{n}}{\tan^{-1} \frac{1}{n}}$ 16) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

17) $a_n = \ln \dfrac{6}{n}$ 17) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Answer the question.

18) For which of the following is the corresponding Taylor series a finite polynomial of degree 3? 18) _______

A) $3\ln(x)$ B) e^{-2x^3} C) $5x^3 + 2x^2 - 12$ D) $x^2 \sin x$

Solve the problem.

19) Use series to estimate the integral's value to within an error of magnitude less than 10^{-3}. 19) _______

$$\int_0^{0.2} e^{-x^2}dx$$

A) 0.2845 B) 0.09758 C) 0.1974 D) 0.4816

Use substitution to find the Taylor series at x = 0 of the given function.

20) e^{-4x} 20) _______

A) $\displaystyle\sum_{n=0}^{\infty} \frac{(4)^n x^n}{n!}$ B) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (4)^n x^n}{n!}$

C) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{(4)^n n!}$ D) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (4)^{4n} x^{4n}}{n!}$

21) $\ln\left(\dfrac{1 + x^3}{1 - x^3}\right)$ 21) _______

A) $\displaystyle\sum_{n=0}^{\infty} \frac{x^{6n+3}}{6n + 3}$ B) $\displaystyle 2\sum_{n=0}^{\infty} \frac{x^{6n+3}}{6n + 3}$

C) $\displaystyle 2\sum_{n=0}^{\infty} \frac{x^{6n+3}}{2n + 1}$ D) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{3n}}{n}$

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

22) $a_n = \dfrac{(n + 5)!}{(n + 1)!}$ 22) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Answer the question.

23) Estimate the error if e^{-4x^2} is approximated by $1 - 4x^2 + \dfrac{4^2x^4}{2!}$ in the integral of $\displaystyle\int_0^1 e^{-4x^2}\, dx$. 23) _______

A) $\dfrac{4^6}{7(3!)}$ B) $\dfrac{4^5}{6(3!)}$ C) $\dfrac{4^4}{5(2!)^2}$ D) $\dfrac{4^6}{7(3!)^2}$

24) Which of the following statements are false? 24) _______

i. For a function f(x), the Taylor polynomial approximation can always be improved by increasing the degree of the polynomial.

ii. Of all polynomials of degree less than or equal to n, the Taylor polynomial of order n gives the best approximation of f(x).

iii. The Taylor series at x = a can be obtained by substituting x - a for x in the corresponding Maclaurin series.

A) iii only B) i, ii, and iii C) i and iii D) i and ii

Determine if the sequence is decreasing or nondecreasing and if it is bounded or unbounded from above.

25) $a_n = \dfrac{\tan^{-1} n}{2}$ 25) _______

A) Decreasing; bounded B) Decreasing; unbounded
C) Nondecreasing; bounded D) Nondecreasing; unbounded

Determine if the series converges or diverges; if the series converges, find its sum.

26) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{3}{7^n}$ 26) ______

A) Converges; $\frac{1}{2}$ B) Converges; $\frac{1}{6}$ C) Converges; $\frac{3}{8}$ D) Diverges

Solve the problem.

27) It can be shown that $\lim_{n\to\infty} \frac{\ln n}{n^c} = 0$ for $c > 0$. Find the smallest value of N such that $\left|\frac{\ln n}{n^c}\right| < \varepsilon$ for all $n > N$ if $\varepsilon = 0.01$ and $c = 1.8$. 27) ______

A) 25 B) 35 C) 31 D) 28

28) Obtain the first nonzero term of the Maclaurin series for $2 \sin x - \sin 2x - x^2 \tan x$. 28) ______

A) $-\frac{7x^5}{18}$ B) $\frac{7x^5}{12}$ C) $-\frac{7x^5}{12}$ D) $\frac{7x^5}{18}$

Find the first four terms of the binomial series for the given function.

29) $\left(1 - \frac{x}{9}\right)^{-2/3}$ 29) ______

A) $1 + \frac{2}{27}x + \frac{10}{729}x^2 + \frac{40}{19683}x^3$ B) $1 - \frac{2}{27}x + \frac{5}{729}x^2 - \frac{40}{59049}x^3$

C) $1 - \frac{2}{27}x + \frac{10}{729}x^2 - \frac{40}{19683}x^3$ D) $1 + \frac{2}{27}x + \frac{5}{729}x^2 + \frac{40}{59049}x^3$

Determine convergence or divergence of the alternating series.

30) $\sum_{n=1}^{\infty} (-1)^n \ln\left[\frac{6n+2}{5n+1}\right]$ 30) ______

A) Diverges B) Converges

Use the limit comparison test to determine if the series converges or diverges.

31) $\sum_{n=1}^{\infty} \frac{1}{7 + 8n \ln n}$ 31) ______

A) converges B) Diverges

Find the sum of the geometric series for those x for which the series converges.

32) $\sum_{n=0}^{\infty} (x - 10)^n$ 32) ______

A) $\frac{1}{11 - x}$ B) $\frac{1}{-9 + x}$ C) $\frac{1}{-9 - x}$ D) $\frac{1}{11 + x}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

33) $\frac{21}{1^2 \cdot 2^2} + \frac{35}{2^2 \cdot 3^2} + \frac{49}{3^2 \cdot 4^2} + \ldots + \frac{7(2n+1)}{n^2(n+1)^2} + \ldots$ 33) ______

A) $\frac{7n(n+2)}{(n+1)^2}; 7$ B) $\frac{7n(n+1)}{(n+2)^2}; 7$

C) $\frac{7n^2}{(n+1)(n+2)}; 7$ D) $\frac{7(n+1)(n+2)}{n^2}; 7$

For what values of x does the series converge absolutely?

34) $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^2 + 10}}$ 34) ______

A) $-\frac{1}{\sqrt{10}} < x < \frac{1}{\sqrt{10}}$ B) $-10 < x < 10$

C) $-\frac{1}{10} < x < \frac{1}{10}$ D) $-1 < x < 1$

Find the Taylor series generated by f at x = a.

35) $f(x) = 5^x$, $a = 9$ 35) ______

A) $\sum_{n=0}^{\infty} \frac{9^5 (\ln 5)^n (x-9)^n}{n!}$ B) $\sum_{n=0}^{\infty} \frac{5^9 (\ln 5)^n (x-9)^n}{(n+1)!}$

C) $\sum_{n=0}^{\infty} \frac{5^9 (\ln 5)^n (x-9)^n}{n!}$ D) $\sum_{n=0}^{\infty} \frac{9^5 (\ln 5)^n (x-9)^n}{(n+1)!}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

36) $a_n = \frac{8n + 1}{5 - 9\sqrt{n}}$ 36) ______

A) $\frac{8}{5}$ B) $-\frac{8}{9}$ C) $-\frac{1}{9}$ D) Diverges

Find the Maclaurin series for the given function.

37) $f(x) = x^{10} e^{2x}$ 37) ______

A) $\sum_{n=0}^{\infty} \frac{2^n x^{n+10}}{(n+10)!}$ B) $\sum_{n=0}^{\infty} \frac{2^n x^{n+10}}{n!}$

C) $\sum_{n=0}^{\infty} \frac{2^{n+10} x^{n+10}}{(n+10)!}$ D) $\sum_{n=0}^{\infty} \frac{2^{n+10} x^{n+10}}{n!}$

Determine either absolute convergence, conditional convergence or divergence for the series.

38) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{7}{4} - \frac{5}{n}\right)^n$ 38) ______

A) Converges absolutely B) Diverges C) Converges conditionally

Solve the problem.

39) Let s_k denote the kth partial sum of the alternating harmonic series. Compute $\frac{s_{19} + s_{20}}{2}$, $\frac{2s_{19} + s_{20}}{3}$, and $\frac{s_{19} + 2s_{20}}{3}$. Which of these is closest to the exact sum (ln 2) of the alternating harmonic series? 39) ______

A) $\frac{s_{19} + s_{20}}{2}$ B) $\frac{2s_{19} + s_{20}}{3}$ C) $\frac{s_{19} + 2s_{20}}{3}$

40) Use the fact that 40) ______

$$\cot x = \frac{1}{x} - \left(\frac{x}{3} + \frac{x^3}{45} + \frac{2x^5}{945} + \ldots\right)$$

for $|x| < \pi$ to find the first four terms of the series for ln(sin x).

A) $\ln|x| - \left(\frac{x^2}{6} + \frac{x^4}{180} + \frac{x^6}{2835} + \ldots\right)$ B) $-\left(\frac{1}{x^2} + \frac{1}{3} + \frac{x^2}{15} + \frac{2x^4}{189} + \ldots\right)$

C) $\frac{1}{x^2} + \frac{1}{3} + \frac{x^2}{15} + \frac{2x^4}{189} + \ldots$ D) $-\ln|x| + \frac{x^2}{6} + \frac{x^4}{180} + \frac{x^6}{2835} + \ldots$

Use the integral test to determine whether the series converges.

41) $\sum_{n=1}^{\infty} \frac{1}{(\ln 5)^n}$ 41) ______

A) converges B) diverges

For what values of x does the series converge absolutely?

42) $\sum_{n=1}^{\infty} \frac{9^n x^n}{n!}$ 42) ______

A) $0 \le x < \infty$ B) $-\infty < x < 0$ C) $0 < x < \infty$ D) $-\infty < x < \infty$

Solve the problem.

43) Let s_k denote the kth partial sum of the alternating harmonic series. If e(14) denotes the absolute value of the error in approximating ln 2 by $\frac{s_{14} + s_{15}}{2}$, compute floor$\left(\frac{1}{\sqrt{e(14)}}\right)$, where floor(x) denotes the integer floor (or greatest integer) function. 43) ______

A) 30 B) 29 C) 28 D) 27

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

44) $F(x) = \int_0^x e^{-t}\,dt$, $[0, 0.5]$ 44) ______

A) $x - \frac{x^2}{2} + \frac{x^3}{6} - \frac{x^4}{10}$ B) $x - \frac{x^2}{2} + \frac{x^3}{6} - \frac{x^4}{24}$

C) $x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{10}$ D) $x - \frac{x^2}{2} + \frac{x^3}{12} - \frac{x^4}{240}$

Solve the problem.

45) An object is rolling with a driving force that suddenly ceases. The object then rolls 10 meters in the first second, and in each subsequent interval of time it rolls 80% of the distance it had rolled the second before. This slowing is due to friction. How far will the object eventually roll? 45) ______

A) It will roll an infinite distance. B) 50.0 meters

C) 20.0 meters D) 12.2 meters

Use the root test to determine if the series converges or diverges.

46) $\sum_{n=1}^{\infty} \frac{n}{(5n^{1/n} - 1)^n}$ 46) ______

A) Converges B) Diverges

Find the sum of the geometric series for those x for which the series converges.

47) $\sum_{n=0}^{\infty} (-1)^n \left(\frac{x - 10}{8}\right)^n$ 47) ______

A) $\frac{8}{2 + x}$ B) $\frac{8}{2 - x}$ C) $\frac{8}{-2 - x}$ D) $\frac{8}{-2 + x}$

Solve the problem.

48) To what value does the Fourier series of 48) ______

$$f(x) = \begin{cases} -8, & -\pi < x < 0 \\ 8, & 0 < x < \pi \end{cases}$$

converge to when x = 0?

A) 4 B) 0 C) 1 D) $\frac{\pi}{2}$

Find the smallest value of N that will make the inequality hold for all n > N.

49) $\left|\sqrt[n]{0.2} - 1\right| < 10^{-3}$ 49) ______

A) 1607 B) 1609 C) 1605 D) 1612

Find the sum of the series as a function of x.

50) $\sum_{n=1}^{\infty} (x + 8)^n$ 50) ______

A) $\frac{x + 8}{x + 9}$ B) $\frac{x + 8}{x + 7}$ C) $-\frac{x + 8}{x + 7}$ D) $-\frac{x + 8}{x + 9}$

Determine if the sequence is bounded.

51) $a_n = 6 - \frac{2}{n}$ 51) ______

A) bounded B) not bounded

Use series to evaluate the limit.

52) $\lim_{x\to 0} \frac{\sin^{-1} 10x - \sin 10x}{\tan^{-1} 10x - \tan 10x}$ 52) ______

A) $\frac{1}{3}$ B) $-\frac{1}{3}$ C) $-\frac{1}{2}$ D) $-\frac{2}{3}$

Find a series solution for the initial value problem.

53) $y'' - 4y = x,\ y(0) = 1,\ y'(0) = \frac{7}{4}$ 53) ______

A) $y = 1 + \frac{7}{4}x + \sum_{n=2}^{\infty} \frac{2^n x^n}{n!}$ B) $y = 1 + \frac{9}{2}x + \sum_{n=2}^{\infty} \frac{2^n x^n}{n!}$

C) $y = 1 + \frac{9}{4}x + \sum_{n=2}^{\infty} \frac{2^n x^n}{n!}$ D) $y = 1 + \frac{7}{2}x + \sum_{n=2}^{\infty} \frac{2^n x^n}{n!}$

Determine convergence or divergence of the series.

54) $\sum_{n=1}^{\infty} \frac{\ln(6n)}{n^4}$ 54) ______

A) Diverges B) Converges

Answer the question.

55) Which of the following statements is false? 55) ______

A) All of these are true.

B) If $\{a_n\}$ and $\{b_n\}$ meet the conditions of the Limit Comparison test, then, if $\lim_{n\to\infty} \frac{a_n}{b_n} = 0$ and $\sum b_n$ converges, then $\sum a_n$ converges.

C) The sequences $\{a_n\}$ and $\{b_n\}$ must be positive for all n to apply the Limit Comparison Test.

D) The series $\sum a_n$ must have no negative terms in order for the Direct Comparison test to be applicable.

Use the direct comparison test to determine if the series converges or diverges.

56) $\sum_{n=1}^{\infty} \frac{1}{n^2 \ln n + 3}$ 56) ______

A) Diverges B) Converges

Solve the problem.

57) Derive a series for $\ln(1 + x)$ for $x > 1$ by first finding the series for $\frac{1}{1+x}$ and then integrating. (Hint: $\frac{1}{1+x} = \frac{1}{x}\frac{1}{1+1/x}$.) 57) ______

A) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{nx^n}$ B) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{nx^{n-1}}$

C) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^n}{nx^{n-1}}$ D) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^n}{nx^n}$

Find the Taylor series generated by f at x = a.

58) $f(x) = x^4 - 7x^2 - 9x + 5,\ a = -4$ 58) ______

A) $(x + 4)^4 - 16(x + 4)^3 + 89(x + 4)^2 - 209(x + 4) + 185$

B) $(x + 4)^4 + 16(x + 4)^3 + 89(x + 4)^2 - 191(x + 4) - 399$

C) $(x + 4)^4 + 16(x + 4)^3 + 89(x + 4)^2 - 209(x + 4) + 185$

D) $(x + 4)^4 - 16(x + 4)^3 + 89(x + 4)^2 - 191(x + 4) - 399$

Find a series solution for the initial value problem.

59) $y' + 2y = 0,\ y(0) = 1$ 59) ______

A) $y = \sum_{n=0}^{\infty} \frac{(-1)^n 2^n x^n}{n}$ B) $y = \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 2^n x^n}{n}$

C) $y = \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 2^n x^n}{n!}$ D) $y = \sum_{n=0}^{\infty} \frac{(-1)^n 2^n x^n}{n!}$

Use the integral test to determine whether the series converges.

60) $\sum_{n=1}^{\infty} \frac{5n}{n^2 + 1}$ 60) ______

A) converges B) diverges

Solve the problem.

61) Using the Maclaurin series for $\ln(1 + x)$, obtain a series for $\frac{\ln(1 + x^2)}{x}$. 61) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{n+1}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{n+1}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{2n+1}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{2n+1}$

Determine either absolute convergence, conditional convergence or divergence for the series.

62) $\sum_{n=1}^{\infty} (-1)^n \frac{(n!)^2 4^n}{(2n+1)!}$ 62) ______

A) converges conditionally B) diverges C) converges absolutely

Use the integral test to determine whether the series converges.

63) $\sum_{n=1}^{\infty} \frac{\cos 1/n}{n^2}$ 63) ______

A) diverges B) converges

Find the Fourier series expansion for the given function.

64) $f(x) = \sin^2 x, \quad -\pi \le x \le \pi$ 64) ______

A) $f(x) = \frac{1}{2} - \frac{\sin 2x}{2}$ B) $f(x) = \frac{1}{2} - \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{\cos 2nx}{2n}$

C) $f(x) = \frac{1}{2} - \frac{\cos 2x}{2}$ D) $f(x) = \frac{1}{2} - \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{\sin 2nx}{2n}$

Find the Maclaurin series for the given function.

65) $f(x) = x^3 e^x$ 65) ______

A) $\sum_{n=0}^{\infty} \frac{3^n x^n}{n!}$ B) $\sum_{n=0}^{\infty} \frac{x^{n+3}}{n!}$ C) $\sum_{n=0}^{\infty} \frac{3^n x^n}{(n+3)!}$ D) $\sum_{n=0}^{\infty} \frac{x^{n+3}}{(n+3)!}$

Find a formula for the nth term of the sequence.

66) $0, \frac{2}{3}, 0, \frac{2}{3}, 0$ (alternating 0's and $\frac{2}{3}$'s) 66) ______

A) $a_n = \frac{1 + (-1)^{n+1}}{2 + (-1)^{n+1}}$ B) $a_n = \frac{1 + (-1)^n}{2 + (-1)^n}$

C) $a_n = \frac{1 - (-1)^n}{2 + (-1)^n}$ D) $a_n = \frac{1 + (-1)^{n+1}}{2 - (-1)^{n+1}}$

Use the direct comparison test to determine if the series converges or diverges.

67) $\sum_{n=1}^{\infty} \frac{10}{3n + 8\sqrt{n}}$ 67) ______

A) Converges B) Diverges

Find the sum of the series as a function of x.

68) $\sum_{n=0}^{\infty} \frac{(x + 10)^{2n}}{2^n}$ 68) ______

A) $-\frac{2}{(x + 10)^2 + 2}$ B) $\frac{2}{(x + 10)^2 - 2}$ C) $\frac{2}{(x + 10)^2 + 2}$ D) $-\frac{2}{(x + 10)^2 - 2}$

Solve the problem.

69) For what value of r does the infinite series 69) ______

$1 + 3r + 6r^2 + 3r^3 + r^4 + 3r^5 + 6r^6 + 3r^7 + r^8 + \ldots$

converge?

A) $|r| < 2$ B) $|r| < \frac{9}{2}$ C) $|r| < \frac{1}{2}$ D) $|r| < 1$

70) For approximately what values of x can cos x be replaced by $1 - \frac{x^2}{2}$ with an error of magnitude no greater than 5×10^{-5}? 70) ______

A) $|x| < 0.10627$ B) $|x| < 0.13161$ C) $|x| < 0.18612$ D) $|x| < 0.06694$

Write the first four elements of the sequence.

71) $\frac{\ln(n + 1)}{n^3}$ 71) ______

A) $0, \frac{\ln 2}{8}, \frac{\ln 3}{27}, \frac{\ln 4}{64}$ B) $0, \frac{\ln 2}{27}, \frac{\ln 3}{64}, \frac{\ln 4}{81}$

C) $\ln 2, \frac{\ln 3}{8}, \frac{\ln 4}{27}, \frac{\ln 5}{64}$ D) $\frac{\ln 2}{8}, \frac{\ln 3}{27}, \frac{\ln 4}{64}, \frac{\ln 5}{81}$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

72) $a_1 = 1,\ a_{n+1} = \frac{a_n}{n + 3}$ 72) ______

A) $1, \frac{1}{4}, \frac{1}{20}, \frac{1}{120}, \frac{1}{840}$ B) $1, \frac{1}{4}, 20, \frac{1}{120}, 840$

C) $1, \frac{1}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$ D) $1, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}$

Find the sum of the series.

73) $\sum_{n=0}^{\infty} \left(\frac{1}{8^n} - \frac{1}{4^n}\right)$ 73) ______

A) $-\frac{4}{7}$ B) $-\frac{4}{21}$ C) $\frac{4}{7}$ D) $\frac{4}{21}$

Use partial fractions to find the sum of the series.

74) $\sum_{n=1}^{\infty} \frac{2}{n(n + 1)(n + 2)}$ 74) ______

A) $\frac{3}{2}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{4}{3}$

Solve the problem.

75) If $p > 1$ and $q > 0$, what can be said about the convergence of 75) ______

$\sum_{n=2}^{\infty} \frac{1}{n^p (\ln n)^q}$?

A) Always diverges B) May converge or diverge C) Always converges

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

76) $\frac{5}{1\cdot 2} + \frac{5}{2\cdot 3} + \frac{5}{3\cdot 4} + \ldots + \frac{5}{n(n + 1)} + \ldots$ 76) ______

A) $\frac{5n}{n + 1}; 5$ B) $\frac{5(n + 1)}{n}; 5$ C) $\frac{5(n + 2)}{n + 1}; 5$ D) $\frac{5(n + 1)}{n + 2}; 5$

Solve the problem.

77) A sequence of rational numbers $\{r_n\}$ is defined by $r_1 = \frac{1}{1}$, and if $r_n = \frac{a}{b}$ then $r_{n+1} = \frac{a + 7b}{a + b}$. Find $\lim_{n\to\infty} r_n$. Hint: Compute the square of several terms of the sequence on a calculator. 77) ______

A) $\sqrt{6}$ B) $\sqrt{14}$ C) $\sqrt{7}$ D) $2\sqrt{2}$

78) A pendulum is released and swings until it stops. If it passes through an arc of 35 inches the first pass, and if on each succesive pass it travels $\frac{1}{5}$ the distance of the preceding pass, how far will it travel before stopping? 78) ______

A) 43.75 in. B) 52.5 in. C) 8.75 in. D) 78.75 in.

Use series to evaluate the limit.

79) $\lim\limits_{x\to\infty} x^2\left(e^{5/x^2} - 1\right)$ 79) ______

A) 5 B) −1 C) 1 D) −5

Solve the problem.

80) To what value does the Fourier series of 80) ______

$$f(x) = \begin{cases} 0, & -2 < x < -1 \\ 6, & -1 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$$

converge to when x = −1?

A) 1 B) 3 C) 0 D) $\frac{\pi}{2}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

81) $a_n = \left(1 + \frac{5}{n}\right)^n$ 81) ______

A) 1 B) e^5 C) e D) Diverges

Find the first four terms of the binomial series for the given function.

82) $(1 + 8x^2)^3$ 82) ______

A) $1 + 24x^2 + 72x^4 + 216x^6$ B) $1 + 24x^2 + 192x^4 + 512x^6$

C) $1 + 24x^2 + 24x^4 + x^6$ D) $1 + 24x^2 + 320x^4 + 3584x^6$

Determine convergence or divergence of the alternating series.

83) $\sum\limits_{n=1}^{\infty} \frac{(-2)^n}{4n^2 + 2^n}$ 83) ______

A) Diverges B) Converges

Find the quadratic approximation of f at x = 0.

84) $f(x) = \sin \ln(8x + 1)$ 84) ______

A) $Q(x) = 1 - 8x + 32x^2$ B) $Q(x) = 1 + 8x + 32x^2$

C) $Q(x) = 8x - 32x^2$ D) $Q(x) = 8x + 32x^2$

Find the sum of the geometric series for those x for which the series converges.

85) $\sum\limits_{n=0}^{\infty} \left(\frac{x - 6}{2}\right)^n$ 85) ______

A) $\frac{6}{8 + x}$ B) $\frac{2}{8 - x}$ C) $\frac{2}{8 + x}$ D) $\frac{6}{8 - x}$

Determine if the sequence is bounded.

86) $\frac{n!}{5^n}$ 86) ______

A) bounded B) not bounded

Use the direct comparison test to determine if the series converges or diverges.

87) $\sum\limits_{n=1}^{\infty} \frac{e^{-5n^2}}{n^2}$ 87) ______

A) diverges B) converges

Find the Maclaurin series for the given function.

88) $f(x) = x^5 \ln(1 + 4x)$ 88) ______

A) $\sum\limits_{n=0}^{\infty} \frac{(-1)^{n-1} 4^n x^{n+5}}{n + 1}$ B) $\sum\limits_{n=1}^{\infty} \frac{(-1)^{n-1} 4^n x^{n+5}}{n}$

C) $\sum\limits_{n=1}^{\infty} \frac{(-1)^{n-1} 4^{n-1} x^{n+4}}{n}$ D) $\sum\limits_{n=0}^{\infty} \frac{(-1)^n 4^n x^{n+5}}{n + 1}$

Find the sum of the series.

89) $\sum\limits_{n=0}^{\infty} \left(\frac{1}{2^n} + \frac{1}{5^n}\right)$ 89) ______

A) $\frac{23}{4}$ B) $\frac{27}{4}$ C) $\frac{17}{4}$ D) $\frac{13}{4}$

Use the root test to determine if the series converges or diverges.

90) $\sum\limits_{n=1}^{\infty} \frac{n}{(\ln n + 10)^n}$ 90) ______

A) Converges B) Diverges

Solve the problem.

91) If the series $\sum\limits_{n=0}^{\infty} (-1)^n (x - 3)^n$ is integrated twice term by term, for what value(s) of x does the new series converge? 91) ______

A) $2 \le x < 4$ B) $2 < x \le 4$ C) $2 \le x \le 4$ D) $2 < x < 4$

Use the limit comparison test to determine if the series converges or diverges.

92) $\sum\limits_{n=1}^{\infty} \frac{10}{2 + 7n (\ln n)^2}$ 92) ______

A) Diverges B) Converges

Find the first four terms of the binomial series for the given function.

93) $(1 + 5x)^{1/2}$ 93) ______

A) $1 + \frac{5}{2}x - \frac{25}{8}x^2 + \frac{125}{32}x^3$ B) $1 - \frac{5}{2}x + \frac{25}{8}x^2 - \frac{125}{32}x^3$

C) $1 + \frac{5}{2}x - \frac{25}{8}x^2 + \frac{125}{16}x^3$ D) $1 - \frac{5}{2}x + \frac{25}{8}x^2 - \frac{125}{16}x^3$

Find the Maclaurin series for the given function.

94) $f(x) = \cos^2 3x$ 94) ______

A) $\frac{1}{2} + \sum\limits_{n=1}^{\infty} \frac{(-1)^n (6)^{2n} x^{2n}}{(2n)!}$ B) $\frac{1}{2} + \sum\limits_{n=0}^{\infty} \frac{(-1)^n (6)^{2n} x^{2n}}{2(2n)!}$

C) $\frac{1}{2} + \sum\limits_{n=0}^{\infty} \frac{(-1)^n (6)^{2n} x^{2n}}{(2n)!}$ D) $\frac{1}{2} + \sum\limits_{n=1}^{\infty} \frac{(-1)^n (6)^{2n} x^{2n}}{2(2n)!}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

95) $a_n = (-1)^n \frac{6}{n}$ 95) ______

A) ±6 B) 0 C) 6 D) Diverges

Use the integral test to determine whether the series converges.

96) $\sum\limits_{n=1}^{\infty} \frac{7}{e^x - 1}$ 96) ______

A) converges B) diverges

Use the ratio test to determine if the series converges or diverges.

97) $\sum\limits_{n=1}^{\infty} \frac{10^n}{n!}$ 97) ______

A) Diverges B) Converges

Use series to evaluate the limit.

98) $\lim\limits_{x\to 0} \frac{e^{5x} - 1 - 5x}{x^2}$ 98) ______

A) 0 B) 25 C) $\frac{25}{4}$ D) $\frac{25}{2}$

Find the values of x for which the geometric series converges.

99) $\sum\limits_{n=0}^{\infty} (x + 3)^n$ 99) ______

A) $-4 < x < -3$ B) $-3 < x < -2$ C) $-4 < x < -2$ D) $-3 < x < 3$

Use the root test to determine if the series converges or diverges.

100) $\sum\limits_{n=1}^{\infty} \frac{(n!)^{3n}}{[(3n)!]^n}$ 100) ______

A) Converges B) Diverges

Find the Fourier series expansion for the given function.

101) $f(x) = \begin{cases} -10, & -\pi < x < 0 \\ 10, & 0 < x < \pi \end{cases}$ 101) ______

A) $f(x) = \frac{20}{\pi} \sum\limits_{n=1}^{\infty} \frac{\cos (2n - 1)x}{2n - 1}$ B) $f(x) = \frac{20}{\pi} \sum\limits_{n=1}^{\infty} \frac{\sin (2n - 1)x}{2n - 1}$

C) $f(x) = \frac{40}{\pi} \sum\limits_{n=1}^{\infty} \frac{\cos (2n - 1)x}{2n - 1}$ D) $f(x) = \frac{40}{\pi} \sum\limits_{n=1}^{\infty} \frac{\sin (2n - 1)x}{2n - 1}$

Solve the problem.

102) If $\sum a_n$ is a convergent series of nonnegative terms, what can be said about $\sum \sqrt[k]{a_n}$, where k is a positive integer? 102) ______

A) Always diverges B) May converge or diverge C) Always converges

Determine if the series converges or diverges; if the series converges, find its sum.

103) $\sum\limits_{n=0}^{\infty} \frac{\sin \frac{(n + 1)\pi}{2}}{4^n}$ 103) ______

A) Converges; 4 B) Converges; $\frac{1}{3}$ C) Converges; $\frac{4}{3}$ D) Diverges

Determine if the series defined by the formula converges or diverges.

104) $a_1 = 7,\ a_{n+1} = \frac{10n - 9}{3n - 5}\, a_n$ 104) ______

A) Converges B) Diverges

Solve the problem.

105) For an alternating series 105) ______

$$\sum\limits_{n=1}^{\infty} (-1)^{n+1} u_n$$

where $\lim\limits_{n\to\infty} u_n \ne 0$, what can be said about the convergence or divergence of the series?

A) The series always converges.

B) The series always diverges.

C) The series may or may not converge.

Use partial fractions to find the sum of the series.

106) $\sum\limits_{n=1}^{\infty} \left(\frac{1}{\sqrt{n + 1}} - \frac{1}{\sqrt{n + 2}}\right)$ 106) ______

A) $\frac{1}{\sqrt{2}}$ B) 1 C) $\frac{1}{\sqrt{6}}$ D) $\frac{1}{\sqrt{3}}$

Solve the problem.

107) If the series $\sum_{n=0}^{\infty} (-1)^n (x-2)^n$ is integrated term by term, for what value(s) of x does the new series converge? 107) ______

A) $1 \le x \le 3$ B) $1 < x \le 3$ C) $1 < x < 3$ D) $1 \le x < 3$

Find the sum of the series as a function of x.

108) $\sum_{n=0}^{\infty} \left(\frac{x-4}{2}\right)^n$ 108) ______

A) $-\frac{2}{x-6}$ B) $-\frac{2}{x+6}$ C) $\frac{2}{x+6}$ D) $\frac{2}{x-6}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

109) $7 - \frac{7}{2} + \frac{7}{4} - \frac{7}{8} + \ldots + (-1)^{n-1}\frac{7}{2^{n-1}} + \ldots$ 109) ______

A) $\frac{7\left(1 - \frac{1}{(-2)^n}\right)}{1 + \frac{1}{2}}$; 14

B) $\frac{7\left(1 - \frac{1}{(-2)^{n-1}}\right)}{1 + \frac{1}{2}}$; $\frac{14}{3}$

C) $\frac{7\left(1 - \frac{1}{(-2)^n}\right)}{1 + \frac{1}{2}}$; $\frac{14}{3}$

D) $\frac{7\left(1 - \frac{1}{(-2)^{n-1}}\right)}{1 + \frac{1}{2}}$; 14

Solve the problem.

110) Use the fact that 110) ______

$$\csc x = \frac{1}{x} + \frac{x}{6} + \frac{7x^3}{360} + \frac{31x^5}{15120} + \ldots$$

(for $|x| < \pi$) to find the first four terms of the series for $2 \csc 2x$ (for $|x| < \frac{\pi}{2}$) and thus for ln tan x.

A) $\ln|x| - \frac{x^2}{12} + \frac{7x^4}{1440} - \frac{31x^6}{90720} + \ldots$

B) $\ln|x| + \frac{x^2}{12} + \frac{7x^4}{1440} + \frac{31x^6}{90720} + \ldots$

C) $\ln|x| + \frac{x^2}{3} + \frac{7x^4}{90} + \frac{62x^6}{2835} + \ldots$

D) $\ln|x| - \frac{x^2}{3} + \frac{7x^4}{90} - \frac{62x^6}{2835} + \ldots$

For what values of x does the series converge conditionally?

111) $\sum_{n=1}^{\infty} \frac{(-1)^n (x+5)^n}{n}$ 111) ______

A) $x = -6, x = -4$ B) $x = -6$ C) $x = -4$ D) None

Find a formula for the nth term of the sequence.

112) −3, −1, 1, 3, 5 (every other integer starting with −3) 112) ______

A) $a_n = 2n - 5$ B) $a_n = n - 7$ C) $a_n = n - 8$ D) $a_n = 2n - 4$

Find the limit of the sequence if it converges; otherwise indicate divergence.

113) $a_n = \frac{n!}{3^n \cdot 8^n}$ 113) ______

A) 0 B) 1 C) e^{24} D) Diverges

Find the quadratic approximation of f at x = 0.

114) $f(x) = \sqrt{36 - x^2}$ 114) ______

A) $Q(x) = 6 - \frac{x^2}{12}$ B) $Q(x) = 6 + \frac{x^2}{12}$ C) $Q(x) = 6 + \frac{x^2}{6}$ D) $Q(x) = 6 - \frac{x^2}{6}$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

115) $a_1 = 1, a_{n+1} = \frac{n a_n}{n+6}$ 115) ______

A) $1, \frac{1}{7}, \frac{2}{56}, \frac{3}{504}, \frac{4}{5040}$

B) $1, \frac{1}{7}, \frac{2}{8}, \frac{6}{9}, \frac{24}{10}$

C) $1, \frac{1}{7}, \frac{8}{7}, \frac{8}{63}, \frac{80}{693}$

D) $1, \frac{1}{7}, \frac{2}{56}, \frac{6}{504}, \frac{24}{5040}$

Solve the problem.

116) If $\sum a_n$ and $\sum b_n$ both converge conditionally, what can be said about $\sum \max\{a_n, b_n\}$? 116) ______

A) The series always converges.

B) The series always diverges.

C) The series may converge or diverge.

Determine if the series converges or diverges; if the series converges, find its sum.

117) $\sum_{n=0}^{\infty} \frac{1}{(\sqrt{3})^n}$ 117) ______

A) Converges; $\frac{3 - \sqrt{3}}{2}$ B) Converges; $\frac{3 + \sqrt{3}}{2}$

C) Converges; $\frac{\sqrt{3} - 3}{2}$ D) Diverges

Solve the problem.

118) If the series $\sum_{n=0}^{\infty} (-1)^n (x-8)^n$ is integrated term by term, for what value(s) of x (if any) does the new series converge and for which the given series does not converge? 118) ______

A) $x = 7$ B) $x = 9$ C) $x = 7, x = 9$ D) none

For what values of x does the series converge absolutely?

119) $\sum_{n=0}^{\infty} (3x)^n$ 119) ______

A) $x > \frac{1}{3}$ B) $0 < x < \frac{1}{3}$ C) $-\frac{1}{3} < x < \frac{1}{3}$ D) None

Solve the problem.

120) A sequence is defined by $f(n) = \text{floor}(\sqrt[3]{n}) \cdot \text{ceiling}(\sqrt[3]{n})$. By looking at several examples on your calculator determine $f(n^3 + 1)$. 120) ______

A) $n^2 + n$ B) $(n-1)^2$ C) $(n+1)^2$ D) $n^2 - n$

Determine convergence or divergence of the series.

121) $\sum_{n=2}^{\infty} \frac{3}{n[\ln(3n)]^{1/3}}$ 121) ______

A) Diverges B) Converges

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

122) $9 + 72 + 576 + \ldots + 9 \cdot 8^{n-1} + \ldots$ 122) ______

A) $\frac{9(1 - 8^n)}{1 - 8}$; $\frac{9}{7}$

B) $\frac{9(1 + 8^n)}{1 + 8}$; 1

C) $\frac{9(1 - 8^n)}{8 - 1}$; series diverges

D) $\frac{9(1 - 8^n)}{1 - 8}$; series diverges

Write the first four elements of the sequence.

123) $\sin(n\pi)$ 123) ______

A) 1, 0, −1, 0 B) 1, 1, 1, 1 C) 0, 0, 0, 0 D) 0, 1, 0, −1

Use series to evaluate the limit.

124) $\lim_{x \to 0} \frac{e^{3x} - 1}{x}$ 124) ______

A) 3 B) −3 C) 0 D) 1

Find the Fourier series expansion for the given function.

125) $f(x) = \begin{cases} 0, & -\pi < x \le 0 \\ x, & 0 \le x < \pi \end{cases}$ 125) ______

A) $f(x) = \frac{\pi}{4} + \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos(2n-1)x}{(2n-1)^2} + \sum_{n=1}^{\infty} \frac{(-1)^n \sin nx}{n}$

B) $f(x) = \frac{\pi}{4} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos(2n-1)x}{(2n-1)^2} - \sum_{n=1}^{\infty} \frac{(-1)^n \sin nx}{n}$

C) $f(x) = \frac{\pi}{4} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin(2n-1)x}{(2n-1)^2} - \sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n}$

D) $f(x) = \frac{\pi}{4} + \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin(2n-1)x}{(2n-1)^2} + \sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n}$

Solve the problem.

126) Obtain the first nonzero term of the Maclaurin series for $\sin^{-1} x - \tan^{-1} x$. 126) ______

A) $\frac{x^3}{2}$ B) $\frac{x^3}{6}$ C) $-\frac{x^3}{3}$ D) $\frac{x^3}{3}$

For what values of x does the series converge conditionally?

127) $\sum_{n=1}^{\infty} \frac{9^n x^n}{n!}$ 127) ______

A) $x = 0$ B) $x = \frac{1}{9}$ C) $x = -\frac{1}{9}$ D) None

Determine convergence or divergence of the series.

128) $\sum_{n=1}^{\infty} \frac{6n + 7}{\sqrt{6n^5 + 5n + 3}}$ 128) ______

A) Diverges B) Converges

Solve the problem.

129) For what value of r does the infinite series 129) ______

$$1 + 5r + r^2 + 5r^3 + r^4 + 5r^5 + r^6 + \ldots$$

converge?

A) $|r| < 5$ B) $|r| < \frac{5}{2}$ C) $|r| < \frac{1}{5}$ D) $|r| < 1$

Determine if the series converges or diverges; if the series converges, find its sum.

130) $\sum_{n=0}^{\infty} \frac{n!}{400^n}$ 130) ______

A) Converges; e B) converges; $\frac{1}{e}$ C) Converges; 1 D) Diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

131) $a_n = \frac{5 + 9n + 7n^4}{6n^4 - 2n^3 + 1}$ 131) ______

A) $\frac{7}{6}$ B) 7 C) $\frac{5}{6}$ D) Diverges

Find the sum of the series as a function of x.

132) $\sum_{n=1}^{\infty} \left(\frac{x+10}{4}\right)^n$ 132) ______

A) $-\frac{x+10}{x+6}$ B) $-\frac{x+10}{x-11}$ C) $-\frac{x+10}{x-6}$ D) $-\frac{x+10}{x-14}$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

133) $a_1 = 4, a_{n+1} = \frac{(-1)^{n+1}}{a_n}$ 133) ______

A) $4, \frac{1}{4}, -4, -\frac{1}{4}, 4$ B) $-4, \frac{1}{4}, 4, -\frac{1}{4}, -4$ C) $4, -\frac{1}{4}, 4, -\frac{1}{4}, 4$ D) $4, -\frac{1}{4}, -4, \frac{1}{4}, 4$

Find the sum of the geometric series for those x for which the series converges.

134) $\sum_{n=0}^{\infty} |\sin 10x|^n$ 134) ______

A) $\frac{10}{1+|\sin 10x|}$ B) $\frac{10}{1-|\sin 10x|}$ C) $\frac{1}{1+|\sin 10x|}$ D) $\frac{1}{1-|\sin 10x|}$

Solve the problem.

135) If $\sum a_n$ converges conditionally, what can be said about $\sum \max\{a_n, |a_n|\}$? 135) ______

A) The series always converges.

B) The series always diverges.

C) The series may converge or diverge.

Find the sum of the geometric series for those x for which the series converges.

136) $\sum_{n=0}^{\infty} (9x+1)^n$ 136) ______

A) $\frac{1}{1+9x}$ B) $\frac{1}{1-9x}$ C) $-\frac{1}{9x}$ D) $\frac{1}{9x}$

Determine convergence or divergence of the alternating series.

137) $\sum_{n=1}^{\infty} (-1)^{n+1}\frac{n+\sqrt{n}}{n^2+1}$ 137) ______

A) Diverges B) Converges

Determine convergence or divergence of the series.

138) $\sum_{n=1}^{\infty} \sin\left(\frac{4n^2+5}{n^3+2}\right)$ 138) ______

A) Converges B) Diverges

Find the infinite sum accurate to 3 decimal places.

139) $\sum_{n=1}^{+\infty} (-1)^{n+1}\frac{1}{(2n)!}$ 139) ______

A) 0.460 B) –0.859 C) 0.859 D) –0.320

Determine if the series defined by the formula converges or diverges.

140) $a_1 = 4,\ a_{n+1} = \frac{10n + 9\sin n}{9n - 1\cos n}a_n$ 140) ______

A) Converges B) Diverges

Solve the problem.

141) Derive the series for $\frac{1}{1+x}$ for $x > 1$ by first writing 141) ______

$\frac{1}{1+x} = \frac{1}{x}\frac{1}{1+1/x}$.

A) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{x^{n+1}}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^{n+1}}$ C) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{x^n}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^n}$

142) Find the sum of the series $\sum_{n=1}^{\infty} \frac{n^2}{7^{n-1}}$ by expressing $\frac{1}{1-x}$ as a geometric series, differentiating both sides of the resulting equation with respect to x, multiplying both sides by x, differentiating again, and replacing x by $\frac{1}{7}$. 142) ______

A) $\frac{7}{27}$ B) $\frac{49}{27}$ C) $\frac{98}{9}$ D) $\frac{56}{27}$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

143) $F(x) = \int_0^x \frac{\sin t}{t}\,dt$, $[0, 0.75]$ 143) ______

A) $x + \frac{x^3}{9} + \frac{x^5}{300}$ B) $x + \frac{x^3}{18}$ C) $x + \frac{x^3}{9}$ D) $x + \frac{x^3}{18} + \frac{x^5}{600}$

Solve the problem.

144) A ball is dropped from a height of 18 m and always rebounds $\frac{1}{3}$ of the height of the previous drop. How far does it travel (up and down) before coming to rest? 144) ______

A) 9 m B) 54 m C) 27 m D) 36 m

Find a series solution for the initial value problem.

145) $y' - 4y = x,\ y(0) = \frac{15}{16}$ 145) ______

A) $y = 1 - \frac{x}{2} + \sum_{n=2}^{\infty} \frac{4^n x^n}{n!}$ B) $y = \frac{15}{16} + \frac{15}{4}x + \sum_{n=2}^{\infty} \frac{4^n x^n}{n!}$

C) $y = 1 - x + \sum_{n=2}^{\infty} \frac{4^n x^n}{n!}$ D) $y = \frac{17}{16} + \frac{17}{4}x + \sum_{n=2}^{\infty} \frac{4^n x^n}{n!}$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

146) $F(x) = \int_0^x \frac{\sin t}{t}\,dt$, $[0, 1]$ 146) ______

A) $x - \frac{x^3}{18} + \frac{x^5}{600}$ B) $x + \frac{x^3}{18} + \frac{x^5}{90}$ C) $x + \frac{x^3}{18} + \frac{x^5}{600}$ D) $x - \frac{x^3}{18} + \frac{x^5}{90}$

Use the integral test to determine whether the series converges.

147) $\sum_{n=1}^{\infty} \frac{1}{8n-1}$ 147) ______

A) diverges B) converges

Find the quadratic approximation of f at x = 0.

148) $f(x) = \ln(1 + \sin 7x)$ 148) ______

A) $Q(x) = 1 - 7x + \frac{49}{2}x^2$ B) $Q(x) = 7x + \frac{49}{2}x^2$

C) $Q(x) = 7x - \frac{49}{2}x^2$ D) $Q(x) = 1 + 7x + \frac{49}{2}x^2$

Determine if the series converges or diverges; if the series converges, find its sum.

149) $\sum_{n=0}^{\infty} e^{-10n}$ 149) ______

A) Converges; $\frac{e^{10}}{e^{10}-1}$ B) Converges; $\frac{1}{e^{-10}-1}$

C) Converges; $\frac{e^{-10}}{e^{-10}-1}$ D) Diverges

Find the sum of the geometric series for those x for which the series converges.

150) $\sum_{n=0}^{\infty} 3^n x^n$ 150) ______

A) $\frac{3}{1-3x}$ B) $\frac{1}{1+3x}$ C) $\frac{3}{1+3x}$ D) $\frac{1}{1-3x}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

151) $a_n = \left(\frac{9}{n}\right)^{9/n}$ 151) ______

A) 0 B) 1 C) ln 9 D) Diverges

Solve the problem.

152) Obtain the first two terms of the Maclaurin series for sin(tan x). 152) ______

A) $x + \frac{x^3}{3}$ B) $x - \frac{x^3}{3}$ C) $x + \frac{x^3}{6}$ D) $x - \frac{x^3}{6}$

Find the Taylor series generated by f at x = a.

153) $f(x) = x^3 - 5x^2 + 10x - 10,\ a = 5$ 153) ______

A) $(x-5)^3 + 10(x-5)^2 + 15(x-5) + 40$ B) $(x-5)^3 - 10(x-5)^2 + 15(x-5) - 40$

C) $(x-5)^3 + 10(x-5)^2 + 35(x-5) + 40$ D) $(x-5)^3 - 10(x-5)^2 + 35(x-5) - 40$

Use partial fractions to find the sum of the series.

154) $\sum_{n=1}^{\infty} \left(\tan^{-1}(n+1) - \tan^{-1}(n)\right)$ 154) ______

A) $\frac{\pi}{2}$ B) π C) $-\frac{\pi}{2}$ D) $-\pi$

Find the quadratic approximation of f at x = 0.

155) $f(x) = e^{\ln 10x}$ 155) ______

A) $Q(x) = 10x$ B) $Q(x) = 1 + 10x + 50x^2$

C) $Q(x) = 10x + 50x^2$ D) $Q(x) = 10x - 50x^2$

Determine if the series defined by the formula converges or diverges.

156) $a_1 = 9,\ a_{n+1} = \frac{2 + \sin n}{n}a_n$ 156) ______

A) Converges B) Diverges

Use the direct comparison test to determine if the series converges or diverges.

157) $\sum_{n=1}^{\infty} \frac{\sin n \cos n}{9^n}$ 157) ______

A) Diverges B) Converges

For what values of x does the series converge conditionally?

158) $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^3+4}}$ 158) ______

A) $x = 1$ B) $x = -1$ C) $x = \pm 1$ D) None

Find the smallest value of N that will make the inequality hold for all n > N.

159) $\left|\sqrt[n]{0.1} - 1\right| < 10^{-2}$ 159) ______

A) 234 B) 227 C) 230 D) 232

Determine if the series defined by the formula converges or diverges.

160) $a_1 = \frac{1}{6},\ a_{n+1} = (a_n)^{n+1}$ 160) ______

A) Converges B) Diverges

Find the Taylor series generated by f at x = a.

161) $f(x) = e^{10x},\ a = 5$ 161) ______

A) $\sum_{n=0}^{\infty} \frac{e^{50}\,10^n (x-5)^n}{n!}$ B) $\sum_{n=0}^{\infty} \frac{e^{50}\,10^{n+1} (x-5)^n}{n!}$

C) $\sum_{n=0}^{\infty} \frac{e^{50}\,10^{n+1} (x-5)^n}{(n+1)!}$ D) $\sum_{n=0}^{\infty} \frac{e^{50}\,10^n (x-5)^n}{(n+1)!}$

Find the quadratic approximation of f at x = 0.

162) $f(x) = x\sqrt{9 - x^2}$ 162) ______

A) $Q(x) = 9x^2$ B) $Q(x) = 3x$ C) $Q(x) = 1 - 3x$ D) $Q(x) = 1 + 3x$

Find the interval of convergence of the series.

163) $\sum_{n=0}^{\infty} (x-6)^n$ 163) ______

A) $5 < x < 7$ B) $-7 < x < 7$ C) $5 \le x < 7$ D) $x < 7$

Determine if the series converges or diverges; if the series converges, find its sum.

164) $\sum_{n=0}^{\infty} \sqrt{10}$ 164) ______

A) Converges; $1 - \sqrt{10}$ B) Converges; $\sqrt{10} - 1$
C) Converges; $\sqrt{10} + 1$ D) Diverges

Find a series solution for the initial value problem.

165) $y' - 8xy = 0$, $y(0) = 1$ 165) ______

A) $y = \sum_{n=0}^{\infty} \frac{8^n x^n}{2^n n!}$ B) $y = \sum_{n=0}^{\infty} \frac{8^n x^{2n}}{2^n n!}$ C) $y = \sum_{n=0}^{\infty} \frac{8^n x^{2n}}{n!}$ D) $y = \sum_{n=0}^{\infty} \frac{8^n x^n}{n!}$

Determine if the series converges or diverges; if the series converges, find its sum.

166) $\sum_{n=0}^{\infty} \frac{\cos n\pi}{7^n}$ 166) ______

A) Converges; $\frac{7}{6}$ B) Converges; $\frac{7}{8}$ C) Converges; $\frac{1}{6}$ D) Diverges

Solve the problem.

167) If $p > 0$ and $q > 0$, what can be said about the convergence of 167) ______

$\sum_{n=2}^{\infty} \frac{1}{n^p (\ln n)^q}$?

A) May converge or diverge B) Always converges C) Always diverges

Determine either absolute convergence, conditional convergence or divergence for the series.

168) $\sum_{n=1}^{\infty} \frac{(-1)^n}{9n^{5/4} + 3}$ 168) ______

A) Converges conditionally B) Converges absolutely C) Diverges

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

169) $a_1 = 6$, $a_{n+1} = (-1)^n a_n$ 169) ______

A) 6, 6, −6, −6, 6 B) −6, 6, −6, 6, −6 C) 6, −6, 6, −6, 6 D) 6, −6, −6, 6, 6

Solve the problem.

170) At a plant that packages bottled spring water, the water is passed through a sequence of ion-exchange filters to reduce the sodium content prior to bottling. Each filter removes 66% of the sodium present in the water passing through it. Determine the number of filters that must be used to reduce the sodium concentration from 24 parts-per-million to 1.98 parts-per-million. 170) ______

A) 7 B) 8 C) 9 D) 6

Find the sum of the geometric series for those x for which the series converges.

171) $\sum_{n=0}^{\infty} -6^n x^n$ 171) ______

A) $\frac{1}{1 + 6x}$ B) $\frac{6}{1 + 6x}$ C) $\frac{6}{1 - 6x}$ D) $\frac{1}{1 - 6x}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

172) $\frac{3}{1 \cdot 2 \cdot 3} + \frac{3}{2 \cdot 3 \cdot 4} + \frac{3}{3 \cdot 4 \cdot 5} + \dots + \frac{3}{n(n+1)(n+2)} + \dots$ 172) ______

A) $\frac{3n(n+2)}{2(n+1)(n+3)}; \frac{3}{2}$ B) $\frac{3n(n+3)}{4(n+1)(n+2)}; \frac{3}{4}$
C) $\frac{3n(n+1)}{4(n+2)(n+3)}; \frac{3}{4}$ D) $\frac{3(n+1)(n+3)}{2n(n+2)}; \frac{3}{2}$

Use the limit comparison test to determine if the series converges or diverges.

173) $\sum_{n=1}^{\infty} \frac{7}{2n - 3 \ln n - 3}$ 173) ______

A) Diverges B) Converges

Solve the problem.

174) Given that the Fourier series of 174) ______

$f(x) = x, -2 < x < 2$

is

$f(x) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n-1} \sin \frac{n\pi x}{2}}{n}$,

what can we say about the series obtained by term-by-term differentiation?

A) The differentiated series diverges even though its nth term approaches zero.
B) The differentiated series converges to $g(x) = 1, -2 < x < 2$.
C) The differentiated series converges to something other than the constant function $g(x) = 1, -2 < x < 2$.
D) The differentiated series diverges since its nth term does not approach zero.

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \geq N$; otherwise indicate divergence.

175) $a_n = \frac{n!}{n^n}$ 175) ______

A) L = ln 2, N = 6 B) L = 0, N = 7 C) L = ln 4, N = 8 D) diverges

For what values of x does the series converge conditionally?

176) $\sum_{n=1}^{\infty} \frac{(x+6)^n}{\sqrt{n}}$ 176) ______

A) x = −7, x = −5 B) x = −7 C) x = −5 D) None

Solve the problem.

177) It can be shown that $\sqrt[n]{n!} \approx \frac{n}{e}$ for large values of n. Find the smallest value of N such that 177) ______

$\frac{\sqrt[n]{n!}}{\frac{n}{e}} - 1 < 10^{-1}$ for all $n > N$.

A) 29 B) 27 C) 22 D) 33

Find the sum of the series.

178) $\sum_{n=8}^{\infty} \frac{1}{3^n}$ 178) ______

A) $\frac{1}{4374}$ B) $\frac{2187}{2}$ C) $\frac{6561}{2}$ D) $\frac{1}{13,122}$

Find the infinite sum accurate to 3 decimal places.

179) $\sum_{n=1}^{+\infty} (-1)^{n+1} \frac{1}{n^5}$ 179) ______

A) −1.036 B) −0.972 C) 1.036 D) 0.972

Find the limit of the sequence if it converges; otherwise indicate divergence.

180) $a_n = n - \sqrt{n^2 - 8n}$ 180) ______

A) 4 B) $\sqrt{8}$ C) 0 D) Diverges

Determine whether the nonincreasing sequence converges or diverges.

181) $a_n = \frac{1 + n \cdot 8^n}{8^n}$ 181) ______

A) Converges B) Diverges

Find the Fourier series expansion for the given function.

182) $f(x) = |x|, \quad -\pi \leq x \leq \pi$ 182) ______

A) $f(x) = \frac{\pi}{2} - \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\cos (2n-1)x}{(2n-1)^2}$ B) $f(x) = \frac{\pi}{2} - \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{\cos 2nx}{(2n)^2}$
C) $f(x) = \frac{\pi}{2} - \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n \cos 2nx}{(2n)^2}$ D) $f(x) = \frac{\pi}{2} - \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n-1} \cos (2n-1)x}{(2n-1)^2}$

Change the repeating decimal to a fraction.

183) 0.1666666 . . . 183) ______

A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{1}{6}$ D) $\frac{5}{3}$

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \geq N$; otherwise indicate divergence.

184) $a_n = 1810^{1/n}$ 184) ______

A) L = 0, N = 1820 B) L = 1, N = 1820 C) L = 1, N = 754 D) diverges

Solve the problem.

185) Obtain the first nonzero term of the Maclaurin series for $\ln(1 + x^2) - x^2 \cos x$. 185) ______

A) $-\frac{7x^6}{12}$ B) $-\frac{7x^6}{24}$ C) $\frac{7x^6}{24}$ D) $\frac{7x^6}{12}$

186) Derive the series for $\frac{x}{1 + x^2}$ for $x > 1$ by first writing 186) ______

$\frac{x}{1 + x^2} = \frac{1}{x} \frac{1}{1 + 1/x^2}$.

A) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{x^{2n+1}}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{x^{2n}}$ C) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^{2n+1}}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^{2n}}$

Use the ratio test to determine if the series converges or diverges.

187) $\sum_{n=1}^{\infty} \frac{n^8}{8^n}$ 187) ______

A) Converges B) Diverges

Find the Maclaurin series for the given function.

188) $f(x) = x^4 \tan^{-1} 5x$ 188) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n 5^{2n+1} x^{2n+4}}{2n+1}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} 5^{2n+1} x^{2n+5}}{2n+1}$
C) $\sum_{n=0}^{\infty} \frac{(-1)^n 5^{2n+1} x^{2n+5}}{2n+1}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} 5^{2n+1} x^{2n+4}}{2n+1}$

Solve the problem.

189) Obtain the first nonzero term of the Maclaurin series for $\sin x - \tan^{-1} x$. 189) ______

A) $\frac{x^3}{3}$ B) $-\frac{x^3}{3}$ C) $\frac{x^3}{6}$ D) $\frac{x^3}{2}$

190) For approximately what values of x can $\tan^{-1} x$ be replaced by $x - \frac{x^3}{3} + \frac{x^5}{5}$ with an error of magnitude no greater than 5×10^{-8}? 190) ______

A) $|x| < 0.11960$ B) $|x| < 0.11699$ C) $|x| < 0.08395$ D) $|x| < 0.08182$

Find the Maclaurin series for the given function.

191) $\frac{\sin 3x}{x}$ 191) ______

A) $\sum_{n=1}^{\infty} \frac{(-1)^{2n+1} 3^{2n+1} x^{2n}}{(2n+1)!}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^{2n+1} 3^{2n+1} x^{2n}}{(2n+1)!}$
C) $\sum_{n=0}^{\infty} \frac{(-1)^n 3^{2n+1} x^{2n}}{(2n+1)!}$ D) $\sum_{n=1}^{\infty} \frac{(-1)^n 3^{2n+1} x^{2n}}{(2n+1)!}$

Determine if the sequence is bounded.

192) $a_n = \frac{4n + 1}{n + 1}$ 192) ______

A) not bounded B) bounded

Find the Fourier series expansion for the given function.

193) $f(x) = \begin{cases} 0, & -2 < x < -1 \\ 9, & -1 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$ 193) ______

A) $f(x) = \frac{9}{2} + \frac{18}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\cos\frac{(2n+1)\pi x}{2}}{2n-1}$

B) $f(x) = \frac{9}{2} - \frac{18}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n+1}\cos\frac{(2n+1)\pi x}{2}}{2n-1}$

C) $f(x) = \frac{9}{2} - \frac{18}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n+1}\cos\frac{(2n-1)\pi x}{2}}{2n-1}$

D) $f(x) = \frac{9}{2} + \frac{18}{\pi}\sum_{n=1}^{\infty} \frac{(-1)^{n-1}\cos\frac{(2n-1)\pi x}{2}}{2n-1}$

Use series to evaluate the limit.

194) $\lim_{x \to 0} \frac{\cos 5x - 1 - \frac{25}{2}x^2}{x^2}$ 194) ______

A) 25 B) −25 C) −5 D) 5

Determine convergence or divergence of the series.

195) $\sum_{n=1}^{\infty} \frac{3}{(6n+1)^{2/3}}$ 195) ______

A) Converges B) Diverges

Find the interval of convergence of the series.

196) $\sum_{n=0}^{\infty} \frac{(x-4)^n}{9n+9}$ 196) ______

A) $3 < x < 5$ B) $-5 \le x < 13$ C) $x < 5$ D) $3 \le x < 5$

Use partial fractions to find the sum of the series.

197) $\sum_{n=1}^{\infty} \left(\frac{1}{n^{3/2}} - \frac{1}{(n+1)^{3/2}}\right)$ 197) ______

A) 1 B) $\frac{1}{2\sqrt{2}}$ C) $\frac{1}{3\sqrt{3}}$ D) $\frac{1}{6\sqrt{6}}$

Solve the problem.

198) Find the sum of the infinite series 198) ______

$1 + 8r + r^2 + 8r^3 + r^4 + 8r^5 + r^6 + \ldots$

for those values of r for which it converges.

A) $\frac{1-8r}{1-r^2}$ B) $\frac{1-8r}{1+r^2}$ C) $\frac{1+8r}{1+r^2}$ D) $\frac{1+8r}{1-r^2}$

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

199) $a_n = \cos n$ 199) ______

A) L = 0, N = 237 B) L = 1, N = 394 C) L = 0, N = 394 D) diverges

Solve the problem.

200) For an alternating series 200) ______

$$\sum_{n=1}^{\infty} (-1)^{n+1} u_n$$

where it is not true that $u_n \ge u_{n+1}$ for sufficiently large n, what can be said about the convergence or divergence of the series?

A) The series always converges.

B) The series always diverges.

C) The series may or may not converge.

Use the root test to determine if the series converges or diverges.

201) $\sum_{n=1}^{\infty} \left(\frac{10n^{1/n} - 1}{5n^{1/n} - 1}\right)^n$ 201) ______

A) Converges B) Diverges

Solve the problem.

202) Find the value of b for which 202) ______

$1 - e^b + e^{2b} - e^{3b} + \ldots = \frac{1}{8}$.

A) ln 8 B) $\ln \frac{8}{9}$ C) ln 7 D) ln 9

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

203) $a_n = \frac{\tan^{-1} n}{e^n}$ 203) ______

A) $L = \frac{\pi}{e}$, N = 8 B) L = 0, N = 5 C) $L = \frac{\pi}{2e}$, N = 6 D) diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

204) $a_n = \frac{5+7n}{1+8n}$ 204) ______

A) 5 B) 33 C) $\frac{7}{8}$ D) Diverges

Find the first four terms of the binomial series for the given function.

205) $\left(1 - \frac{x}{9}\right)^{1/3}$ 205) ______

A) $1 - \frac{1}{27}x + \frac{1}{729}x^2 - \frac{5}{19683}x^3$

B) $1 - \frac{1}{27}x - \frac{1}{243}x^2 - \frac{5}{19683}x^3$

C) $1 - \frac{1}{27}x - \frac{1}{729}x^2 - \frac{5}{59049}x^3$

D) $1 - \frac{1}{27}x + \frac{1}{729}x^2 - \frac{5}{59049}x^3$

Find the Taylor polynomial of order 3 generated by f at a.

206) $f(x) = x^3$, a = 10 206) ______

A) $4000 + 300(x - 100) + 20(x - 100)^2 + (x - 100)^3$

B) $6 + 3(x - 100) + (x - 100)^2 + (x - 100)^3$

C) $1000 + 100(x - 100) + 100(x - 100)^2 + (x - 100)^3$

D) $1000 + 300(x - 100) + 30(x - 100)^2 + (x - 100)^3$

Find the limit of the sequence if it converges; otherwise indicate divergence.

207) $a_n = \frac{\tan^{-1} n}{\sqrt[5]{n}}$ 207) ______

A) 1 B) $\frac{\pi}{2}$ C) 0 D) Diverges

Use partial fractions to find the sum of the series.

208) $\sum_{n=1}^{\infty} \left(\frac{1}{\ln(n+1)} - \frac{1}{\ln(n+2)}\right)$ 208) ______

A) $\frac{1}{\ln 1}$ B) ln 2

C) The series diverges. D) $\frac{1}{\ln 2}$

Find the first four terms of the binomial series for the given function.

209) $(1 + 7x)^{-1/2}$ 209) ______

A) $1 - \frac{7}{2}x + \frac{147}{8}x^2 - \frac{1715}{32}x^3$

B) $1 - \frac{7}{2}x + \frac{147}{8}x^2 - \frac{1715}{16}x^3$

C) $1 - \frac{7}{2}x + \frac{147}{8}x^2 - \frac{5145}{32}x^3$

D) $1 - \frac{7}{2}x - \frac{147}{4}x^2 - \frac{1715}{16}x^3$

Solve the problem.

210) Find the sum of the series $\sum_{n=1}^{\infty} \frac{n^3}{n!}$. [Hint: Write the series as 210) ______

$1 + 4 + \sum_{n=3}^{\infty} \frac{n^3}{n!} = 5 + \sum_{n=3}^{\infty} \frac{n(n-1)(n-2)}{n!} + 3\sum_{n=3}^{\infty} \frac{n(n-1)}{n!} + \sum_{n=3}^{\infty} \frac{n}{n!}$.]

A) 9e − 11 B) 5e C) 8(e − 1) D) 3e + 5

Find a formula for the nth term of the sequence.

211) 7, 8, 9, 10, 11 (integers beginning with 7) 211) ______

A) $a_n = n + 8$ B) $a_n = n + 7$ C) $a_n = n + 6$ D) $a_n = n - 7$

Find the Taylor polynomial of order 3 generated by f at a.

212) $f(x) = \frac{1}{9-x}$, a = 0 212) ______

A) $\frac{1}{9} + \frac{x}{81} + \frac{x^2}{729} + \frac{x^3}{6561}$

B) $\frac{1}{9} - \frac{x}{81} + \frac{x^2}{729} - \frac{x^3}{6561}$

C) $\frac{x}{9} + \frac{x^2}{81} + \frac{x^3}{729} + \frac{x^4}{6561}$

D) $\frac{x}{9} - \frac{x^2}{81} + \frac{x^3}{729} - \frac{x^4}{6561}$

Find the values of x for which the geometric series converges.

213) $\sum_{n=0}^{\infty} (x-5)^n$ 213) ______

A) $4 < x < 5$ B) $-5 < x < 5$ C) $4 < x < 6$ D) $5 < x < 6$

Solve the problem.

214) To what value does the Fourier series of 214) ______

$f(x) = \begin{cases} 0, & -2 < x < -1 \\ 8, & -1 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$

converge to when x = 1?

A) 4 B) 1 C) $\frac{\pi}{2}$ D) 0

Determine either absolute convergence, conditional convergence or divergence for the series.

215) $\sum_{n=1}^{\infty} \frac{(-3)^n}{7n^4 + 8^n}$ 215) ______

A) Converges absolutely B) Converges conditionally C) Diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

216) $a_n = \ln\left(1 + \frac{3}{n}\right)^n$ 216) ______

A) 0 B) ln 3 C) 3 D) Diverges

Find a series solution for the initial value problem.

217) $y'' - 6y' + 9y = 0$, $y(0) = 0$, $y'(0) = 1$ 217) ______

A) $y = \sum_{n=0}^{\infty} \frac{3^n x^{n+1}}{(n+1)!}$

B) $y = \sum_{n=0}^{\infty} \frac{3^n x^{n+1}}{n!}$

C) $y = \sum_{n=1}^{\infty} \frac{3^n x^n}{n!}$

D) $y = \sum_{n=1}^{\infty} \frac{3^n x^{n+1}}{n!}$

Solve the problem.

218) Using the Maclaurin series for $\ln(1 + x)$, obtain a series for $\ln\frac{1+x}{1-x}$. 218) ______

A) $2\sum_{n=0}^{\infty}\frac{x^{2n+1}}{2n+1}$ B) $\sum_{n=0}^{\infty}\frac{x^{2n+1}}{2n+1}$

C) $2\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{2n+1}$ D) $\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{2n+1}$

Answer the question.

219) Which of the following is not a condition for applying the integral test to the sequence $\{a_n\}$, where $a_n = f(n)$? 219) ______

A) All of these are conditions for applying the integral test.

B) $f(x)$ is continuous for $x \geq N$

C) $f(x)$ is decreasing for $x \geq N$

D) $f(x)$ is everywhere positive

Find the interval of convergence of the series.

220) $\sum_{n=1}^{\infty}\frac{(x-6)^n}{\ln(n+8)}$ 220) ______

A) $5 \leq x < 7$ B) $x < 7$ C) $-\infty < x < \infty$ D) $5 < x < 7$

Solve the problem.

221) A sequence is defined by $f(n) = \text{floor}(\sqrt{n})\cdot\text{ceiling}(\sqrt{n})$. By looking at several examples on your calculator determine $f(n^2 + 1)$. 221) ______

A) $n^2 + n$ B) $(n + 1)^2$ C) $n^2 - n$ D) $(n - 1)^2$

Find the Taylor polynomial of order 3 generated by f at a.

222) $f(x) = \frac{1}{x+3}$, $a = 0$ 222) ______

A) $\frac{x}{3} + \frac{x^2}{9} + \frac{x^3}{27} + \frac{x^4}{81}$ B) $\frac{1}{3} - \frac{x}{9} + \frac{x^2}{27} - \frac{x^3}{81}$

C) $\frac{x}{3} - \frac{x^2}{9} + \frac{x^3}{27} - \frac{x^4}{81}$ D) $\frac{1}{3} + \frac{x}{9} + \frac{x^2}{27} + \frac{x^3}{81}$

Solve the problem.

223) It can be shown that $\lim_{n\to\infty}\frac{1}{n^c} = 0$ for $c > 0$. Find the smallest value of N such that $\left|\frac{1}{n^c}\right| < \varepsilon$ for all $n > N$ if $\varepsilon = 0.01$ and $c = 1.8$. 223) ______

A) 10 B) 12 C) 13 D) 11

Find the first four terms of the binomial series for the given function.

224) $\left(1 + \frac{x}{8}\right)^3$ 224) ______

A) $1 + \frac{3}{16}x + \frac{3}{256}x^2 + \frac{1}{4096}x^3$ B) $1 - \frac{3}{8}x + \frac{3}{64}x^2 - \frac{1}{512}x^3$

C) $1 - \frac{3}{16}x + \frac{3}{256}x^2 - \frac{1}{4096}x^3$ D) $1 + \frac{3}{8}x + \frac{3}{64}x^2 + \frac{1}{512}x^3$

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \geq N$; otherwise indicate divergence.

225) $a_n = \sqrt[n]{n+1}$ 225) ______

A) L = 1, N = 394 B) L = ln 2, N = 394 C) L = 1, N = 652 D) diverges

Use series to evaluate the limit.

226) $\lim_{x\to 0}\frac{\sin 7x - \sin 14x}{x}$ 226) ______

A) -7 B) -1 C) 1 D) 7

Solve the problem.

227) Find the value of b for which 227) ______

$1 + e^b + e^{2b} + e^{3b} + \ldots = 2$.

A) $\ln\frac{3}{2}$ B) $\ln\frac{1}{2}$ C) $\ln 2$ D) $\ln\frac{2}{3}$

Find the Taylor series generated by f at x = a.

228) $f(x) = \frac{1}{9-x}$, $a = 7$ 228) ______

A) $\sum_{n=0}^{\infty}\frac{(x-7)^n}{2^n}$ B) $\sum_{n=0}^{\infty}\frac{(x-7)^{n+1}}{2^{n+1}}$ C) $\sum_{n=0}^{\infty}\frac{(x-7)^n}{2^{n+1}}$ D) $\sum_{n=0}^{\infty}\frac{(x-7)^{n+1}}{2^n}$

Determine if the sequence is bounded.

229) $\frac{\pi^n}{4^n}$ 229) ______

A) bounded B) not bounded

Find the sum of the series.

230) $\sum_{n=0}^{\infty}\frac{3}{5^n}$ 230) ______

A) $\frac{1}{2}$ B) $\frac{15}{4}$ C) $\frac{3}{4}$ D) $\frac{5}{2}$

Solve the problem.

231) If $\cos x$ is replaced by $1 - \frac{x^2}{2}$ and $|x| < 0.7$, what estimate can be made of the error? 231) ______

A) $|E| < 0.014292$ B) $|E| < 0.040017$ C) $|E| < 0.010004$ D) $|E| < 0.057167$

Find the limit of the sequence if it converges; otherwise indicate divergence.

232) $a_n = 1 + (-1)^n + (-1)^{n(n+1)}$ 232) ______

A) 0 B) 3 C) 1 D) Diverges

Find the values of x for which the geometric series converges.

233) $\sum_{n=0}^{\infty}(-1)^n(2x)^{2n}$ 233) ______

A) $|x| < 1$ B) $|x| < 4$ C) $|x| < 2$ D) $|x| < \frac{1}{2}$

Find the first four terms of the binomial series for the given function.

234) $(1 - 7x)^{1/2}$ 234) ______

A) $1 - \frac{7}{2}x - \frac{49}{8}x^2 - \frac{343}{16}x^3$ B) $1 + \frac{7}{2}x + \frac{49}{8}x^2 - \frac{343}{32}x^3$

C) $1 - \frac{7}{2}x - \frac{49}{8}x^2 - \frac{343}{32}x^3$ D) $1 - \frac{7}{2}x + \frac{49}{8}x^2 - \frac{343}{16}x^3$

Use the integral test to determine whether the series converges.

235) $\sum_{n=1}^{\infty}\frac{1}{5n}$ 235) ______

A) diverges B) converges

Find the Maclaurin series for the given function.

236) e^{-10x} 236) ______

A) $\sum_{n=1}^{\infty}\frac{(-1)^n 3^n x^n}{n!}$ B) $\sum_{n=1}^{\infty}\frac{3^n x^n}{n!}$

C) $\sum_{n=0}^{\infty}\frac{3^n x^n}{n!}$ D) $\sum_{n=0}^{\infty}\frac{(-1)^n 3^n x^n}{n!}$

Estimate the magnitude of the error involved in using the sum of the first four terms to approximate the sum of the entire series.

237) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{2^n}$ 237) ______

A) 1.56×10^{-2} B) $\frac{1}{n}$ C) 3.13×10^{-2} D) 6.25×10^{-2}

Use the direct comparison test to determine if the series converges or diverges.

238) $\sum_{n=1}^{\infty}\frac{1}{6^{n-1}+1}$ 238) ______

A) converges B) diverges

Find the smallest value of N that will make the inequality hold for all n > N.

239) $\frac{n^2}{2^n} < 10^{-3}$ 239) ______

A) 20 B) 18 C) 19 D) 17

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

240) $7 - 56 + 448 - 3584 + \ldots + (-1)^{n-1}\, 7 \cdot 8^{n-1} + \ldots$ 240) ______

A) $\frac{7\left(1-(-8)^n\right)}{1+8}$; series diverges B) $\frac{7\left(1-(-8)^n\right)}{1+8}$; $\frac{7}{9}$

C) $\frac{7\left(1-(-8)^n\right)}{1-8}$; 1 D) $\frac{7\left(1-(-8)^n\right)}{8-1}$; series diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

241) $a_n = (-1)^n\left(1 - \frac{8}{n}\right)$ 241) ______

A) 0 B) 1 C) 8 D) Diverges

Find the first four terms of the binomial series for the given function.

242) $(1 + 4x)^{1/3}$ 242) ______

A) $1 - \frac{4}{3}x + \frac{16}{3}x^2 - \frac{320}{81}x^3$ B) $1 + \frac{4}{3}x - \frac{16}{9}x^2 + \frac{320}{81}x^3$

C) $1 + \frac{4}{3}x + \frac{16}{9}x^2 + \frac{64}{27}x^3$ D) $1 + \frac{4}{3}x - \frac{16}{9}x^2 + \frac{64}{27}x^3$

Use the root test to determine if the series converges or diverges.

243) $\sum_{n=1}^{\infty}\left(\frac{7n}{\ln n + 6n + 2}\right)^n$ 243) ______

A) Diverges B) Converges

Find the sum of the series.

244) $\sum_{n=1}^{\infty}\frac{7}{2^n}$ 244) ______

A) $\frac{14}{3}$ B) 14 C) 7 D) $\frac{7}{3}$

Determine convergence or divergence of the alternating series.

245) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{3(n+1)^{3/2}}{n^{3/2}+1}$ 245) ______

A) Converges B) Diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

246) $a_n = 7 + (0.9)^n$ 246) ______

A) 7.9 B) 8 C) 7 D) Diverges

Use the root test to determine if the series converges or diverges.

247) $\sum_{n=1}^{\infty}\frac{n}{\left(n^{1/n}+3\right)^n}$ 247) ______

A) Diverges B) Converges

Find the sum of the geometric series for those x for which the series converges.

248) $\sum_{n=0}^{\infty} (-1)^n (8x)^{2n}$ 248) ______

A) $\frac{64}{1+64x^2}$ B) $\frac{1}{1+64x^2}$ C) $\frac{1}{1-64x^2}$ D) $\frac{8}{1+64x^2}$

Solve the problem.

249) Let $f(n) = \sqrt{n^2+6} - \sqrt{n^2-6}$. What is f(n) approximately equal to as n gets large? Hint: Compute various examples on your calculator. 249) ______

A) $\frac{6}{2n}$ B) $\frac{6}{n^2}$ C) $\frac{6}{n}$ D) $\frac{6}{\sqrt{n}}$

Use the ratio test to determine if the series converges or diverges.

250) $\sum_{n=1}^{\infty} \frac{5n!}{n^n}$ 250) ______

A) Diverges B) Converges

Determine either absolute convergence, conditional convergence or divergence for the series.

251) $\sum_{n=1}^{\infty} (\cos n\pi)\left(\frac{n!}{2^n}\right)$ 251) ______

A) diverges B) converges absolutely C) converges conditionally

Determine convergence or divergence of the series.

252) $\sum_{n=1}^{\infty} \frac{6n^2+7}{n^4+7n+5}$ 252) ______

A) Converges B) Diverges

Use the limit comparison test to determine if the series converges or diverges.

253) $\sum_{n=1}^{\infty} \frac{(\ln n)^2}{\sqrt{n}(3n+8\sqrt{n})}$ 253) ______

A) Converges B) Diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

254) $a_n = \frac{(\ln n)^4}{\sqrt{n}}$ 254) ______

A) e^4 B) ln 4 C) 0 D) Diverges

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

255) $a_1 = 1$, $a_{n+1} = 6a_n$ 255) ______

A) 1, 7, 13, 19, 25 B) 6, 36, 216, 1296, 7776
C) 1, 6, 36, 216, 1296 D) 6, 7, 8, 9, 10

Find the sum of the series.

256) $\sum_{n=0}^{\infty} (-1)^n \frac{5}{2^n}$ 256) ______

A) $\frac{10}{3}$ B) $\frac{5}{3}$ C) 5 D) 10

Determine if the series defined by the formula converges or diverges.

257) $a_1 = \frac{1}{7}$, $a_{n+1} = \sqrt[n]{a_n}$ 257) ______

A) Converges B) Diverges

Solve the problem.

258) A child on a swing sweeps out a distance of 24 ft on the first pass. If she is allowed to continue swinging until she stops, and if on each pass she sweeps out a distance $\frac{1}{4}$ of the previous pass, how far does the child travel? 258) ______

A) 16 ft B) 32 ft C) 8 ft D) 56 ft

Find a formula for the nth term of the sequence.

259) 0, 0, 2, 2, 0, 0, 2, 2 (alternating 0's and 2's in pairs) 259) ______

A) $a_n = 1 + (-1)^{\frac{n(n+1)}{2}}$ B) $a_n = 1 + (-1)^{n(n+1)}$

C) $a_n = 1 - (-1)^{n(n-1)}$ D) $a_n = 1 + (-1)^{n(n-1)}$

Find the first four terms of the binomial series for the given function.

260) $\left(1+\frac{x}{3}\right)^{-2}$ 260) ______

A) $1 - \frac{2}{3}x + \frac{1}{3}x^2 - \frac{4}{9}x^3$ B) $1 - \frac{2}{3}x + \frac{4}{9}x^2 - \frac{8}{27}x^3$

C) $1 - \frac{2}{3}x + \frac{1}{3}x^2 - \frac{4}{27}x^3$ D) $1 - \frac{2}{3}x + \frac{4}{9}x^2 - \frac{2}{9}x^3$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

261) $F(x) = \int_0^x \frac{\tan^{-1} t}{t}\,dt$, [0, 0.5] 261) ______

A) $x - \frac{x^3}{9} + \frac{x^5}{25}$ B) $x - \frac{x^3}{3} + \frac{x^5}{5}$ C) $x - \frac{x^3}{3} + \frac{x^5}{60}$ D) $x - \frac{x^3}{6} + \frac{x^5}{120}$

Find the smallest value of N that will make the inequality hold for all n > N.

262) $\left|\sqrt[n]{2n} - 1\right| < 10^{-3}$ 262) ______

A) 9891 B) 9907 C) 9883 D) 9899

For what values of x does the series converge conditionally?

263) $\sum_{n=0}^{\infty} (x+6)^n$ 263) ______

A) x = -5 B) x = -6 C) x = -7 D) None

Find the Fourier series expansion for the given function.

264) $f(x) = \begin{cases} 1, & -\pi < x < 0 \\ 0, & 0 < x < \pi \end{cases}$ 264) ______

A) $f(x) = \frac{1}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos(2n-1)x}{2n-1}$ B) $f(x) = \frac{1}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin(2n-1)x}{2n-1}$

C) $f(x) = \frac{1}{2} + \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos(2n-1)x}{2n-1}$ D) $f(x) = \frac{1}{2} + \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin(2n-1)x}{2n-1}$

Find a formula for the nth term of the sequence.

265) $1, -\frac{1}{4}, \frac{1}{9}, -\frac{1}{16}, \frac{1}{25}$ (reciprocals of squares with alternating signs) 265) ______

A) $a_n = \frac{(-1)^n}{n^2}$ B) $a_n = \frac{(-1)^{n^2}}{n^2}$ C) $a_n = \frac{(-1)^{n+1}}{n^2}$ D) $a_n = \frac{(-1)^{2n+1}}{n^2}$

Find the Taylor series generated by f at x = a.

266) $f(x) = \frac{1}{x^2}$, a = 9 266) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n n(x-9)^n}{9^{n+2}}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n n(x-9)^n}{9^{n+1}}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n (n+1)(x-9)^n}{9^{n+1}}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n (n+1)(x-9)^n}{9^{n+2}}$

For what values of x does the series converge absolutely?

267) $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^3+7}}$ 267) ______

A) $-1 \le x \le 1$ B) $-1 < x \le 1$ C) $-1 < x < 1$ D) $-1 \le x < 1$

Find the limit of the sequence if it converges; otherwise indicate divergence.

268) $a_n = \left(\frac{2n}{n+1}\right)^n$ 268) ______

A) 2 B) e^2 C) 0 D) Diverges

Find the sum of the series.

269) $\sum_{n=0}^{\infty} \left(\frac{1}{4^n} - \frac{(-1)^n}{4^n}\right)$ 269) ______

A) $\frac{4}{15}$ B) $\frac{8}{17}$ C) $\frac{4}{17}$ D) $\frac{8}{15}$

Change the repeating decimal to a fraction.

270) 0.335335 . . . 270) ______

A) $\frac{3350}{999}$ B) $\frac{3350}{99}$ C) $\frac{335}{999}$ D) $\frac{335}{99}$

Determine convergence or divergence of the series.

271) $\sum_{n=1}^{\infty} \frac{3n^{1/3}}{6n^{4/3}+3}$ 271) ______

A) Diverges B) Converges

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

272) $a_n = \frac{2^n}{n!}$ 272) ______

A) L = ln 2, N = 6 B) L = ln 4, N = 8 C) L = 0, N = 8 D) diverges

Determine whether the nonincreasing sequence converges or diverges.

273) $a_1 = 1$, $a_{n+1} = 4a_n - 7$ 273) ______

A) Diverges B) Converges

Find the quadratic approximation of f at x = 0.

274) $f(x) = \tan^{-1} 7x$ 274) ______

A) $Q(x) = 1 + 7x^2$ B) $Q(x) = 1 - 7x^2$ C) $Q(x)\ 1 + \frac{7}{2}x^2$ D) $Q(x) = 7x$

For what values of x does the series converge absolutely?

275) $\sum_{n=0}^{\infty} (x-1)^n$ 275) ______

A) $0 \le x < 2$ B) $0 < x < 2$ C) $0 < x \le 2$ D) $0 \le x \le 2$

Solve the problem.

276) If $\sum a_n$ converges, what can be said about $\sum a_n a_{n+1}$? 276) ______

A) The series always converges.
B) The series always diverges.
C) The series may converge or diverge.

277) Use the fact that 277) ______

$$\tan^{-1} x = \sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{2n-1}}{(2n-1)}$$

for $|x| < 1$ to find the series for $\cot^{-1} x$.

A) $\frac{\pi}{2} - \sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{2n-1}}{(2n-1)}$ B) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^{2n-1}}{(2n-1)}$

C) $\sum_{n=1}^{\infty} \frac{(-1)^n x^{2n-1}}{(2n-1)}$ D) $\frac{\pi}{2} - \sum_{n=1}^{\infty} \frac{(-1)^n x^{2n-1}}{(2n-1)}$

Find the infinite sum accurate to 3 decimal places.

278) $\sum_{n=1}^{+\infty} \frac{2(-1)^{n+1}}{3^n}$ 278) _____

A) 1.000 B) 1.500 C) 3.000 D) 0.500

Find the quadratic approximation of f at x = 0.

279) $f(x) = \ln(\cos 9x)$ 279) _____

A) $Q(x) = 1 - \frac{81}{2}x^2$ B) $Q(x) = \frac{81}{2}x^2$ C) $Q(x) = 1 + \frac{81}{2}x^2$ D) $Q(x) = -\frac{81}{2}x^2$

For what values of x does the series converge conditionally?

280) $\sum_{n=0}^{\infty} (5x)^n$ 280) _____

A) $x = 0$ B) $x = \frac{1}{5}$ C) $x = -\frac{1}{5}$ D) None

Find the Maclaurin series for the given function.

281) $\cos(-5x)$ 281) _____

A) $-\sum_{n=0}^{\infty} \frac{(-1)^n 5^{2n} x^{2n}}{(2n)!}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^{2n} 5^{2n} x^{2n}}{(2n)!}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n 5^{2n} x^{2n}}{(2n)!}$ D) $-\sum_{n=0}^{\infty} \frac{(-1)^{2n} 5^{2n} x^{2n}}{(2n)!}$

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

282) $a_n = n \tan\frac{1}{n}$ 282) _____

A) L = 0, N = 28 B) L = 1, N = 6 C) L = 1, N = 28 D) diverges

Use the direct comparison test to determine if the series converges or diverges.

283) $\sum_{n=1}^{\infty} \frac{8 + 9\cos n}{n^5}$ 283) _____

A) Diverges B) Converges

Find a formula for the nth term of the sequence.

284) 0, 2, 2, 2, 0, 2, 2, 2 (0 and 3 2's repeated) 284) _____

A) $a_n = 1 + (-1)^{\frac{n(n+1)(n+2)}{6}}$ B) $a_n = 1 + (-1)^{\frac{(n+1)(n+2)}{2}}$

C) $a_n = 1 + (-1)^{\frac{n(n+1)}{2}}$ D) $a_n = 1 + (-1)^{\frac{n(n-1)}{2}}$

Use the limit comparison test to determine if the series converges or diverges.

285) $\sum_{n=1}^{\infty} \frac{(\ln n)^3}{\sqrt{n}(5 + 8\sqrt[3]{n})}$ 285) _____

A) Diverges B) Converges

Use the integral test to determine whether the series converges.

286) $\sum_{n=1}^{\infty} \frac{7}{\sqrt{n}}$ 286) _____

A) diverges B) converges

Solve the problem.

287) If $\tan^{-1} x$ is replaced by $x - \frac{x^3}{3} + \frac{x^5}{5}$ and $|x| < 0.5$, what estimate can be made of the error? 287) _____

A) $|E| < 0.0011161$ B) $|E| < 0.0013021$ C) $|E| < 0.0026042$ D) $|E| < 0.0022321$

Find a series solution for the initial value problem.

288) $y'' + 100y = x,\ y(0) = 1,\ y'(0) = \frac{1}{100}$ 288) _____

A) $y = 1 + \frac{x}{100} + \sum_{n=1}^{\infty} \frac{(-1)^n 10^{2n} x^{2n}}{(2n)!}$ B) $y = 1 - \frac{x}{100} + \sum_{n=1}^{\infty} \frac{(-1)^n 10^{2n} x^{2n}}{(2n)!}$

C) $y = 1 - \frac{x}{100} + \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 10^{2n} x^{2n}}{(2n)!}$ D) $y = 1 + \frac{x}{100} + \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 10^{2n} x^{2n}}{(2n)!}$

Use the direct comparison test to determine if the series converges or diverges.

289) $\sum_{n=1}^{\infty} \frac{1}{(\ln 8n)^n}$ 289) _____

A) Diverges B) Converges

Solve the problem.

290) Find the sum of the series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{n}{2^{n-1}}$ by expressing $\frac{1}{1+x}$ as a geometric series, differentiating both sides of the resulting equation with respect to x, and replacing x by $\frac{1}{2}$. 290) _____

A) 4 B) $\frac{1}{4}$ C) $\frac{4}{9}$ D) $\frac{9}{4}$

Find the Taylor polynomial of order 3 generated by f at a.

291) $f(x) = \frac{1}{x+5}$, a = 1 291) _____

A) $\frac{1}{4} - \frac{x-1}{16} + \frac{(x-1)^2}{64} - \frac{(x-1)^3}{256}$ B) $\frac{1}{6} - \frac{x+1}{36} + \frac{(x+1)^2}{216} - \frac{(x+1)^3}{1296}$

C) $\frac{1}{4} - \frac{x+1}{16} + \frac{(x+1)^2}{64} - \frac{(x+1)^3}{256}$ D) $\frac{1}{6} - \frac{x-1}{36} + \frac{(x-1)^2}{216} - \frac{(x-1)^3}{1296}$

292) $f(x) = x^2$, a = 6 292) _____

A) $36 + 12(x - 36) + 18(x - 36)^2 + 24(x - 36)^3$

B) $1 + 12(x - 36) + 18(x - 36)^2 + 24(x - 36)^3$

C) $36 + 12(x - 36) + (x - 36)^2$

D) $1 + 72(x - 36) + 648(x - 36)^2 + 5184(x - 36)^3$

Use the integral test to determine whether the series converges.

293) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{e^{2n} - 1}}$ 293) _____

A) diverges B) converges

Answer the question.

294) Which of the following sequences do not meet the conditions of the Integral Test? 294) _____

i). $a_n = n(\sin n + 1)$

ii). $a_n = \frac{1}{n^P + p}$

iii). $a_n = \frac{1}{n\sqrt{n}}$

A) i and iii B) ii and iii C) i only D) 1, ii, and iii

Solve the problem.

295) If $\sum a_n$ is a convergent series of nonnegative terms, what can be said about $\sum n a_n$? 295) _____

A) Always converges B) Always diverges C) May converge or diverge

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

296) $F(x) = \int_0^x (\tan^{-1} t)^2\, dt$, [0, 0.5] 296) _____

A) $\frac{x^3}{3} - \frac{2x^9}{27}$ B) $\frac{x^3}{3} - \frac{2x^9}{9}$ C) $\frac{x^3}{3} - \frac{x^{15}}{15}$ D) $\frac{x^3}{3} - \frac{2x^{15}}{15}$

Use partial fractions to find the sum of the series.

297) $\sum_{n=1}^{\infty} \frac{7}{n(n+3)}$ 297) _____

A) $\frac{49}{18}$ B) $\frac{35}{6}$ C) $\frac{77}{18}$ D) $\frac{49}{6}$

Find the Fourier series expansion for the given function.

298) $f(x) = x\cos\frac{\pi x}{11}$, $-11 < x < 11$ 298) _____

A) $f(x) = \frac{11}{2\pi}\cos\frac{\pi x}{11} - \frac{22}{\pi}\sum_{n=2}^{\infty} \frac{(-1)^n n \sin\frac{n\pi x}{11}}{n^2 - 1}$

B) $f(x) = \frac{11}{2\pi}\sin\frac{\pi x}{22} - \frac{22}{\pi}\sum_{n=2}^{\infty} \frac{(-1)^n n \sin\frac{n\pi x}{11}}{n^2 - 1}$

C) $f(x) = -\frac{11}{2\pi}\sin\frac{\pi x}{11} + \frac{22}{\pi}\sum_{n=2}^{\infty} \frac{(-1)^n n \sin\frac{n\pi x}{11}}{n^2 - 1}$

D) $f(x) = \frac{11}{2\pi}\cos\frac{\pi x}{22} - \frac{22}{\pi}\sum_{n=2}^{\infty} \frac{(-1)^n n \sin\frac{n\pi x}{11}}{n^2 - 1}$

Solve the problem.

299) If $\sum a_n$ converges conditionally, what can be said about $\sum \min\{a_n, |a_n|\}$? 299) _____

A) The series always converges.

B) The series always diverges.

C) The series may converge or diverge.

Determine convergence or divergence of the series.

300) $\sum_{n=1}^{\infty} n^3 e^{-4n^5}$ 300) _____

A) Diverges B) Converges

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

301) $a_n = n\cos\frac{1}{n}$ 301) _____

A) L = 0, N = 28 B) L = 0, N = 37 C) L = 1, N = 28 D) diverges

Use partial fractions to find the sum of the series.

302) $\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n+1}} - \frac{1}{\sqrt{n+3}}\right)$ 302) _____

A) $\frac{1}{\sqrt{3}} - \frac{1}{\sqrt{6}}$ B) $\frac{1}{\sqrt{3}} + \frac{1}{2}$ C) $\frac{1}{\sqrt{3}} + \frac{1}{\sqrt{6}}$ D) $\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}}$

Solve the problem.

303) Use the fact that 303) ______

$$\sin^{-1} x = x + \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)\, x^{2n+1}}{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)(2n+1)}$$

for $|x| < 1$ to find the series for $\cos^{-1} x$.

A) $\frac{\pi}{2} - x - \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)\, x^{2n+1}}{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)(2n+1)}$

B) $\frac{\pi}{2} - x + \sum_{n=1}^{\infty} \frac{(-1)^n \cdot 1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)\, x^{2n+1}}{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)(2n+1)}$

C) $\frac{\pi}{2} - x + \sum_{n=1}^{\infty} \frac{(-1)^{n+1} \cdot 1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)\, x^{2n+1}}{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)(2n+1)}$

D) $\frac{\pi}{2} - \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \ldots \cdot (2n-1)\, x^{2n+1}}{2 \cdot 4 \cdot 6 \cdot \ldots \cdot (2n)(2n+1)}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

304) $a_n = \frac{8 + (-1)^n}{8}$ 304) ______

A) $\frac{9}{8}$ B) 0 C) 1 D) Diverges

For what values of x does the series converge conditionally?

305) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} (x+3)^n}{n5^n}$ 305) ______

A) $x = -8, x = 2$ B) $x = 2$ C) $x = -8$ D) None

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

306) $a_1 = 1, a_2 = 3, a_{n+2} = a_{n+1} - a_n$ 306) ______

A) 1, 3, 2, 1, 0 B) 1, 3, 2, −1, −3 C) 1, −1, 2, −3, 5 D) 1, −3, 4, −5, 6

Solve the problem.

307) Let 307) ______

$$f(x) = \begin{cases} 4, & -\pi < x < 0 \\ 8, & 0 < x < \pi \end{cases}$$

and

$$g(x) = \begin{cases} 3, & -\pi < x < 0 \\ 4, & 0 < x < \pi \end{cases}.$$

To what value does the Fourier series of $f(x) + g(x)$ converge to when $x = 0$?

A) $\frac{7}{4}$ B) $\frac{19}{2}$ C) 3 D) $\frac{19}{4}$

Use the direct comparison test to determine if the series converges or diverges.

308) $\sum_{n=1}^{\infty} \frac{5}{2\sqrt{n} + 9\sqrt[3]{n}}$ 308) ______

A) Converges B) Diverges

Solve the problem.

309) If $\sum a_n$ converges, what can be said about $\sum a_n{}^k$, where k is an integer greater than 1? 309) ______

A) The series always converges.

B) The series always diverges.

C) The series may converge or diverge.

310) Derive a series for $\ln(1 + x^2)$ for $x > 1$ by first finding the series for $\frac{x}{1 + x^2}$ and then integrating. 310) ______

(Hint: $\frac{x}{1 + x^2} = \frac{1}{x} \frac{1}{1 + 1/x^2}$.)

A) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{nx^{2n}}$ B) $\ln x + \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{nx^{2n}}$

C) $2 \ln x + \sum_{n=1}^{\infty} \frac{(-1)^n}{nx^{2n}}$ D) $2 \ln x + \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{nx^{2n}}$

For what values of x does the series converge absolutely?

311) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} (x+8)^n}{n7^n}$ 311) ______

A) $0 < x \le -1$ B) $0 < x < -1$ C) $-15 \le x < -1$ D) $-15 < x < -1$

Solve the problem.

312) Mari drops a ball from a height of 14 meters and notices that on each bounce the ball returns to about 5/6 of its previous height. About how far will ball travel before it comes to rest? 312) ______

A) 30.8 meters B) 84 meters C) 154 meters D) 168 meters

Find the values of x for which the geometric series converges.

313) $\sum_{n=0}^{\infty} |\sin 2x|^n$ 313) ______

A) $-\infty < x < \infty$ B) $\{x | \text{ x is not an odd multiple of } \pi/4\}$

C) $\{x | \text{ x is not a multiple of } \pi\}$ D) diverges for all x

Use the root test to determine if the series converges or diverges.

314) $\sum_{n=1}^{\infty} \left(\frac{1}{n^5} - \frac{1}{n^9}\right)^n$ 314) ______

A) Converges B) Diverges

Use partial fractions to find the sum of the series.

315) $\sum_{n=1}^{\infty} \frac{7}{(4n-1)(4n+3)}$ 315) ______

A) $\frac{7}{18}$ B) $\frac{7}{6}$ C) $\frac{7}{12}$ D) $\frac{7}{4}$

Find the smallest value of N that will make the inequality hold for all n > N.

316) $\frac{10^n}{n!} < 10^{-3}$ 316) ______

A) 30 B) 20 C) 31 D) 21

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

317) $a_n = (1 + 0.153/n)^n$ 317) ______

A) $L \approx 1.1653, N = 6$ B) $L \approx 1.153, N = 6$

C) $L \approx 1.1653, N = 2$ D) diverges

Find the first four terms of the binomial series for the given function.

318) $(1 - 8x^2)^{-1/2}$ 318) ______

A) $1 + 4x^2 + 48x^4 + 320x^6$ B) $1 + 4x^2 + 48x^4 + 576x^6$

C) $1 + 4x^2 + 24x^4 + 288x^6$ D) $1 + 4x^2 + 24x^4 + 160x^6$

Determine either absolute convergence, conditional convergence or divergence for the series.

319) $\sum_{n=1}^{\infty} (-5)^{-n}$ 319) ______

A) diverges B) converges absolutely C) converges conditionally

Solve the problem.

320) For approximately what values of x can cos x be replaced by $1 - \frac{x^2}{2} + \frac{x^4}{24}$ with an error of magnitude no greater than 5×10^{-4}? 320) ______

A) $|x| < 0.81519$ B) $|x| < 0.84343$ C) $|x| < 0.56968$ D) $|x| < 0.62569$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

321) $a_1 = 1, a_{n+1} = a_n + 4$ 321) ______

A) 1, 4, 16, 64, 256, 1024 B) 1, 5, 9, 13, 17, 21

C) 1, 5, 9, 13, 17 D) 5, 9, 13, 17, 21

Find the values of x for which the geometric series converges.

322) $\sum_{n=0}^{\infty} \left(\frac{x-2}{4}\right)^n$ 322) ______

A) $-2 < x < 6$ B) $6 < x < 10$ C) $-6 < x < 10$ D) $-6 < x < 6$

Find the Taylor series generated by f at x = a.

323) $f(x) = e^x, a = 9$ 323) ______

A) $\sum_{n=0}^{\infty} \frac{e^9 (x-9)^n}{(n+1)!}$ B) $\sum_{n=0}^{\infty} \frac{e^9 (x-9)^{n+1}}{(n+1)!}$

C) $\sum_{n=0}^{\infty} \frac{e^9 (x-9)^{n+1}}{n!}$ D) $\sum_{n=0}^{\infty} \frac{e^9 (x-9)^n}{n!}$

Solve the problem.

324) The polynomial $1 + 8x + 28x^2$ is used to approximate $f(x) = (1 + x)^8$ on the interval $-0.01 \le x \le 0.01$. Use the Remainder Estimation Theorem to estimate the maximum absolute error. 324) ______

A) $\approx 5.886 \times 10^{-4}$ B) $\approx 5.886 \times 10^{-5}$ C) $\approx 3.642 \times 10^{-5}$

Find a formula for the nth term of the sequence.

325) 0, −1, 0, 1, 0, −1, 0, 1 (0, −1, 0, 1 repeated) 325) ______

A) $a_n = \cos(n\pi)$ B) $a_n = \sin(n\pi)$ C) $a_n = \cos\left(\frac{n\pi}{2}\right)$ D) $a_n = \sin\left(\frac{n\pi}{2}\right)$

326) 0, 2, 0, 2, 0 (alternating 0's and 2's) 326) ______

A) $a_n = 1 - (-1)^n$ B) $a_n = 1 + (-1)^n$ C) $a_n = 1 + (-1)^{n-1}$ D) $a_n = 1 + (-1)^{n+1}$

Use the ratio test to determine if the series converges or diverges.

327) $\sum_{n=1}^{\infty} \frac{3(n!)^2}{(2n)!}$ 327) ______

A) Converges B) Diverges

By calculating an appropriate number of terms, determine if the series converges or diverges. If it converges, find the limit L and the smallest integer N such that $|a_n - L| < 0.01$ for $n \ge N$; otherwise indicate divergence.

328) $a_n = \frac{\cos n}{n^2}$ 328) ______

A) $L = 0, N = 8$ B) $L = 0, N = 10$ C) $L = 0, N = 13$ D) diverges

Answer the question.

329) Which of the following statements is false? 329) ______

A) If a_n and f(n) satisfy the requirements of the Integral Test, and if $\int_1^{\infty} f(x)dx$ converges, then

$$\sum_{n=1}^{\infty} a_n = \int_1^{\infty} f(x)dx$$

B) $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges if $p > 1$ and diverges if $p \le 1$.

C) The integral test does not apply to divergent sequences.

D) $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p}$ converges if $p > 1$.

Solve the problem.

330) If $p > 1$ and $q > 1$, what can be said about the convergence of 330) ______

$$\sum_{n=2}^{\infty} \frac{1}{(\ln n)^p (\ln \ln n)^q}?$$

A) Always converges B) May converge or diverge C) Always diverges

Find the infinite sum accurate to 3 decimal places.

331) $\sum_{n=1}^{+\infty} (-1)^n \frac{1}{(4n+1)^3}$ 331) ______

A) −0.007 B) 0.010 C) −0.010 D) 0.007

Determine convergence or divergence of the alternating series.

332) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{5/3}}$ 332) ______

A) Diverges B) Converges

Find the values of x for which the geometric series converges.

333) $\sum_{n=0}^{\infty} \frac{(-1)^n}{10} \frac{1}{(5 + \sin x)^n}$ 333) ______

A) $-\infty < x < \infty$ B) $\left\{x \mid x \text{ is not a multiple of } \pi\right\}$

C) diverges for all x D) $\left\{x \mid x \text{ is not a multiple of } 2\pi\right\}$

Find the limit of the sequence if it converges; otherwise indicate divergence.

334) $a_n = \sqrt[n]{4n}$ 334) ______

A) 0 B) 1 C) ln 4 D) Diverges

Find the values of x for which the geometric series converges.

335) $\sum_{n=0}^{\infty} -2^n x^n$ 335) ______

A) $|x| < 2$ B) $|x| < 4$ C) $|x| < \frac{1}{2}$ D) $|x| < 1$

Find the Maclaurin series for the given function.

336) $f(x) = \frac{1}{(1 - 2x)^2}$ 336) ______

A) $\sum_{n=0}^{\infty} (n+1)\, 2^n x^n$ B) $\sum_{n=0}^{\infty} n\, 2^{n+1} x^{n+1}$

C) $\sum_{n=0}^{\infty} n\, 2^n x^n$ D) $\sum_{n=0}^{\infty} (n+1)\, 2^{n+1} x^{n+1}$

Solve the problem.

337) A company adopts an advertising campaign to weekly add to its customer base. It assumes that as an average fifty percent of its new customers, those added the previous week, will bring in one friend, but those who have been customers longer will not be very effective as recruiters and can be discounted. A media campaign brings in 10,000 customers initially. What is the expected total number of customer with whom the company can expect to have dealings? 337) ______

A) 15,000 B) 30,000

C) The sum diverges to infinity. D) 20,000

Find the smallest value of N that will make the inequality hold for all n > N.

338) $\frac{n^2}{2^n} < 10^{-2}$ 338) ______

A) 17 B) 16 C) 18 D) 15

Determine convergence or divergence of the alternating series.

339) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{2n^6 + 5}{6n^3 + 4}\right)$ 339) ______

A) Converges B) Diverges

Find a series solution for the initial value problem.

340) $y'' + 7y' = 0,\ y(0) = 2,\ y'(0) = -7$ 340) ______

A) $y = 1 + \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 7^n x^n}{n!}$ B) $y = 2 + \sum_{n=1}^{\infty} \frac{(-1)^n 7^n x^n}{n!}$

C) $y = 2 + \sum_{n=1}^{\infty} \frac{(-1)^{n-1} 7^n x^n}{n!}$ D) $y = 1 - x + \sum_{n=2}^{\infty} \frac{(-1)^n 7^n x^n}{n!}$

Find the infinite sum accurate to 3 decimal places.

341) $\sum_{n=1}^{+\infty} (-1)^{n+1} \left(\frac{1}{4^n}\right)$ 341) ______

A) 0.200 B) −0.571 C) 0.143 D) 0.800

Solve the problem.

342) A company's annual revenue for the period since 2000 can be modeled by the function $R_n = 2.13(1.05)^n$, where R is in millions of dollars and n = 0 corresponds to 2000. Assuming the model accurately predicts future revenue, find the year in which the revenue first exceeds $3.50 million. 342) ______

A) 2011 B) 2010 C) 2013 D) 2009

Use the root test to determine if the series converges or diverges.

343) $\sum_{n=1}^{\infty} \frac{(n!)^n}{(n^n)^{10}}$ 343) ______

A) Diverges B) Converges

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

344) $F(x) = \int_0^x \frac{\ln(1 + t^2)}{t}\, dt$, $[0, 0.6]$ 344) ______

A) $\frac{x^2}{2} - \frac{x^4}{8} + \frac{x^6}{32}$ B) $\frac{x^2}{2} - \frac{x^4}{4} + \frac{x^6}{6}$ C) $\frac{x^2}{2} - \frac{x^4}{8} + \frac{x^6}{18}$ D) $\frac{x^2}{2} - \frac{x^4}{16} + \frac{x^6}{128}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

345) $\frac{7}{2\cdot 3} + \frac{7}{3\cdot 4} + \frac{7}{4\cdot 5} + \ldots + \frac{7}{(n+1)(n+2)} + \ldots$ 345) ______

A) $\frac{7n}{n+1}; 7$ B) $\frac{7n}{2(n+2)}; \frac{7}{2}$ C) $\frac{7n}{2(n+1)}; \frac{7}{2}$ D) $\frac{7n}{n+2}; 7$

Find the Taylor polynomial of order 3 generated by f at a.

346) $f(x) = \ln(x + 1),\ a = 6$ 346) ______

A) $\ln + \frac{x-6}{5} + \frac{(x-6)^2}{50} + \frac{(x-6)^3}{375}$ B) $\ln 7 + \frac{x-6}{7} - \frac{(x-6)^2}{98} + \frac{(x-6)^3}{1029}$

C) $\ln 5 - \frac{x-6}{5} + \frac{(x-6)^2}{50} - \frac{(x-6)^3}{375}$ D) $\ln 7 - \frac{x-6}{7} + \frac{(x-6)^2}{98} - \frac{(x-6)^3}{1029}$

Use the integral test to determine whether the series converges.

347) $\sum_{n=1}^{\infty} 6 \cos^{-1}(1/x)$ 347) ______

A) diverges B) converges

Find the Taylor polynomial of order 3 generated by f at a.

348) $f(x) = \ln x,\ a = 8$ 348) ______

A) $\frac{\ln 8}{8} - \frac{x-8}{64} + \frac{(x-8)^2}{512} - \frac{(x-8)^3}{4096}$ B) $\ln 8 - \frac{x-8}{8} + \frac{(x-8)^2}{128} - \frac{(x-8)^3}{1536}$

C) $\frac{\ln 8}{8} + \frac{x-8}{64} + \frac{(x-8)^2}{512} + \frac{(x-8)^3}{4096}$ D) $\ln 8 + \frac{x-8}{8} - \frac{(x-8)^2}{128} + \frac{(x-8)^3}{1536}$

Determine either absolute convergence, conditional convergence or divergence for the series.

349) $\sum_{n=1}^{\infty} (-1)^n \left(\sqrt{n^2 + 1} - n\right)$ 349) ______

A) converges absolutely B) converges conditionally C) diverges

For what values of x does the series converge absolutely?

350) $\sum_{n=0}^{\infty} (-1)^n (5x + 4)^n$ 350) ______

A) $-\frac{3}{2} \le x < -1$ B) $-1 < x < -\frac{3}{5}$ C) $-\frac{3}{2} < x < -1$ D) $-1 < x \le -\frac{3}{5}$

Determine if the series defined by the formula converges or diverges.

351) $a_1 = 5,\ a_{n+1} = \frac{n}{n+1} a_n$ 351) ______

A) Converges B) Diverges

Change the repeating decimal to a fraction.

352) 1.545454 . . . 352) ______

A) $1\frac{6}{11}$ B) $15\frac{5}{11}$ C) $\frac{17}{111}$ D) $1\frac{59}{111}$

Solve the problem.

353) If $\sum a_n$ is a convergent series of nonnegative terms, what can be said about $\sum n^k a_n$, where k is a positive integer? 353) ______

A) Always converges B) Always diverges C) May converge or diverge

Use series to evaluate the limit.

354) $\lim_{x \to 0} \frac{1 + \ln(1 + 6x^2) - \cos 6x}{x^2}$ 354) ______

A) 18 B) 24 C) 39 D) 3

Find the sum of the series.

355) $\sum_{n=1}^{\infty} \left(\frac{1}{4^n} - \frac{1}{5^n}\right)$ 355) ______

A) $-\frac{3}{4}$ B) $\frac{3}{4}$ C) $\frac{1}{12}$ D) $-\frac{1}{12}$

Determine if the series converges or diverges; if the series converges, find its sum.

356) $\sum_{n=0}^{\infty} \left(1 + \frac{-4}{n}\right)^{3n}$ 356) ______

A) Converges; $\frac{1}{|-4| - 1}$ B) Converges; e^{-12}

C) Converges; $\frac{1}{|-4| + 1}$ D) Diverges

Find the Taylor polynomial of order 3 generated by f at a.

357) $f(x) = \frac{1}{7 - x},\ a = 1$ 357) ______

A) $\frac{1}{6} - \frac{x+1}{36} + \frac{(x+1)^2}{216} - \frac{(x+1)^3}{1296}$ B) $\frac{1}{6} + \frac{x-1}{36} + \frac{(x-1)^2}{216} + \frac{(x-1)^3}{1296}$

C) $\frac{1}{8} - \frac{x-1}{64} + \frac{(x-1)^2}{512} - \frac{(x-1)^3}{4096}$ D) $\frac{1}{8} - \frac{x+1}{64} + \frac{(x+1)^2}{512} - \frac{(x+1)^3}{4096}$

Find the quadratic approximation of f at x = 0.

358) $f(x) = e^{\sin 10x}$ 358) ______

A) $Q(x) = 1 - 10x + 50x^2$ B) $Q(x) = 10x - 50x^2$

C) $Q(x) = 1 + 10x + 50x^2$ D) $Q(x) = 10x + 50x^2$

Use the limit comparison test to determine if the series converges or diverges.

359) $\sum_{n=1}^{\infty} \frac{2 + 7 \sin n}{9n^{5/4} + 5 \cos n}$ 359) ______

A) Converges B) Diverges

Solve the problem.

360) Let s_k denote the kth partial sum of the alternating harmonic series. Compute s_{19}, s_{20}, and $\frac{s_{19} + s_{20}}{2}$. Which of these is closest to the exact sum (ln 2) of the alternating harmonic series? 360) ______

A) s_{19} B) s_{20} C) $\frac{s_{19} + s_{20}}{2}$

361) A child on a swing initially swings through an arc length of 12 meters. The child stops pushing and sits patiently waiting for the swing to stop moving. If friction slows the swing so the length of each arc is 80% of the length of the previous arc, how far will the child have traveled before the swing stops? 361) ______

A) 24 meters B) 25 meters
C) The child will travel an infinite distance. D) 60 meters

Determine if the series converges or diverges; if the series converges, find its sum.

362) $\sum_{n=1}^{\infty} \ln \frac{7}{n}$ 362) ______

A) Converges; 1 B) Converges; $\ln \frac{1}{7}$ C) Converges; ln 7 D) Diverges

Find the Maclaurin series for the given function.

363) $\frac{1}{x - 6}$ 363) ______

A) $-\sum_{n=0}^{\infty} \frac{x^n}{6^{n+1}}$ B) $-\sum_{n=0}^{\infty} \frac{x^n}{6^n}$ C) $\sum_{n=0}^{\infty} \frac{x^n}{6^{n+1}}$ D) $\sum_{n=0}^{\infty} \frac{x^n}{6^n}$

Use series to evaluate the limit.

364) $\lim_{x \to \infty} x^3\left(\sin \frac{2}{x} - \tan \frac{2}{x}\right)$ 364) ______

A) -1 B) -2 C) -4 D) $-\frac{1}{2}$

For what values of x does the series converge conditionally?

365) $\sum_{n=0}^{\infty} (-1)^n (9x + 3)^n$ 365) ______

A) $x = -3$ B) $x = -\frac{4}{9}$ C) $x = -\frac{2}{9}$ D) None

For what values of x does the series converge absolutely?

366) $\sum_{n=2}^{\infty} \frac{x^n}{n(\ln n)^2}$ 366) ______

A) $x = 0$ B) $-1 < x < 1$ C) $-1 \le x \le 1$ D) $0 \le x < \infty$

Find the limit of the sequence if it converges; otherwise indicate divergence.

367) $a_n = \ln(9n - 3) - \ln(5n + 3)$ 367) ______

A) $\ln\left(\frac{5}{9}\right)$ B) $\ln\left(\frac{9}{5}\right)$ C) ln 4 D) Diverges

Solve the problem.

368) Find the sum of the series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{n^2}{6^{n-1}}$ by expressing $\frac{1}{1 + x}$ as a geometric series, differentiating both sides of the resulting equation with respect to x, multiplying both sides by x, differentiating again, and replacing x by $\frac{1}{6}$. 368) ______

A) $\frac{30}{343}$ B) $\frac{180}{343}$ C) $\frac{180}{49}$ D) $\frac{150}{343}$

Find the Taylor series generated by f at x = a.

369) $f(x) = x^2 + 6x - 1$, $a = -1$ 369) ______

A) $(x + 1)^2 + 4(x + 1) - 4$ B) $(x - 1)^2 + 4(x - 1) - 6$
C) $(x - 1)^2 + 4(x - 1) - 4$ D) $(x + 1)^2 + 4(x + 1) - 6$

Estimate the magnitude of the error involved in using the sum of the first four terms to approximate the sum of the entire series.

370) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(0.4)^{2n+1}}{2n + 1}$ 370) ______

A) 1.40×10^{-6} B) 2.91×10^{-5} C) 4.19×10^{-5} D) 3.81×10^{-6}

Use the direct comparison test to determine if the series converges or diverges.

371) $\sum_{n=1}^{\infty} \left(\frac{n}{10n + 7}\right)^n$ 371) ______

A) Diverges B) Converges

Change the repeating decimal to a fraction.

372) 0.88888 . . . 372) ______

A) $\frac{80}{99}$ B) $\frac{8}{99}$ C) $\frac{80}{999}$ D) $\frac{8}{9}$

Solve the problem.

373) If sin x is replaced by $x - \frac{x^3}{6}$ and $|x| < 0.7$, what estimate can be made of the error? 373) ______

A) $|E| < 0.0070029$ B) $|E| < 0.010004$ C) $|E| < 0.0014006$ D) $|E| < 0.0020008$

374) A sequence of rational numbers $\{r_n\}$ is defined by $r_1 = \frac{2}{1}$, and if $r_n = \frac{a}{b}$ then $r_{n+1} = \frac{a + b}{a - b}$. Find r_{50}. 374) ______

A) 50 B) 2 C) 3 D) 49

Find the interval of convergence of the series.

375) $\sum_{n=0}^{\infty} \frac{(x - 9)^n}{9 + 7n}$ 375) ______

A) $\frac{65}{9} < x < \frac{97}{9}$ B) $2 \le x \le 16$ C) $2 < x < 16$ D) $8 \le x < 10$

Solve the problem.

376) If cos x is replaced by $1 - \frac{x^2}{2} + \frac{x^4}{24}$ and $|x| < 0.5$, what estimate can be made of the error? 376) ______

A) $|E| < 0.000043403$ B) $|E| < 0.000021701$
C) $|E| < 0.00026042$ D) $|E| < 0.00013021$

377) Find the sum of the series $\sum_{n=1}^{\infty} \frac{n^2}{n!}$. [Hint: Write the series as 377) ______

$1 + \sum_{n=2}^{\infty} \frac{n^2}{n!} = 1 + \sum_{n=2}^{\infty} \frac{n(n - 1)}{n!} + \sum_{n=2}^{\infty} \frac{n}{n!}$.]

A) $3(e - 1)$ B) $2e$ C) $4e - 5$ D) $e + 3$

Determine convergence or divergence of the alternating series.

378) $\sum_{n=1}^{\infty} \frac{(-1)^n}{5n^2 + 3}$ 378) ______

A) Diverges B) Converges

For what values of x does the series converge absolutely?

379) $\sum_{n=1}^{\infty} \frac{(-1)^n (x - 10)^n}{n}$ 379) ______

A) $9 < x \le 11$ B) $9 \le x < 11$ C) $9 \le x \le 11$ D) $9 < x < 11$

Find a series solution for the initial value problem.

380) $y'' + 8y' = x$, $y(0) = -1$, $y'(0) = \frac{511}{64}$ 380) ______

A) $y = 1 + -\frac{511}{64}x - \frac{511}{16}x^2 + \sum_{n=3}^{\infty} \frac{(-1)^n 8^n x^n}{n!}$

B) $y = -1 + \frac{511}{64}x - \frac{511}{16}x^2 + \sum_{n=3}^{\infty} \frac{(-1)^{n-1} 8^n x^n}{n!}$

C) $y = -1 + \frac{513}{64}x - \frac{513}{16}x^2 + \sum_{n=3}^{\infty} \frac{(-1)^{n-1} 8^n x^n}{n!}$

D) $y = 1 + -\frac{511}{64}x + \frac{511}{16}x^2 + \sum_{n=3}^{\infty} \frac{(-1)^n 8^n x^n}{n!}$

Determine if the sequence is bounded.

381) $\frac{e^n}{2^n}$ 381) ______

A) bounded B) not bounded

For what values of x does the series converge conditionally?

382) $\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^2 + 4}}$ 382) ______

A) $x = -1$ B) $x = 1$ C) $x = \pm 1$ D) None

Find the smallest value of N that will make the inequality hold for all n > N.

383) $\left|\sqrt[n]{2n} - 1\right| < 10^{-2}$ 383) ______

A) 737 B) 750 C) 733 D) 731

Use the limit comparison test to determine if the series converges or diverges.

384) $\sum_{n=2}^{\infty} \frac{1}{7 + 9n \ln \ln n}$ 384) ______

A) Diverges B) Coverges

Solve the problem.

385) A ball is dropped from a height of 50 meters. If each bounce brings it to 90% of its previous height, how far will the ball travel before it stops? 385) ______

A) 200 meters B) 950 meters C) 500 meters D) 250 meters

Change the repeating decimal to a fraction.

386) 0.868686 . . . 386) ______

A) $\frac{860}{999}$ B) $\frac{86}{999}$ C) $\frac{860}{99}$ D) $\frac{86}{99}$

For what values of x does the series converge conditionally?

387) $\sum_{n=2}^{\infty} \frac{x^n}{n(\ln n)^7}$ 387) ______

A) $x = 1$ B) $x = -1$ C) $x = \pm 1$ D) None

Determine if the series converges or diverges; if the series converges, find its sum.

388) $\sum_{n=1}^{\infty} \frac{5^{n+1}}{9^{n-1}}$ 388) ______

A) Converges; $\frac{225}{4}$ B) Converges; $\frac{45}{4}$ C) Converges; $\frac{405}{4}$ D) Diverges

Solve the problem.

389) Use a graphical method to determine the approximate interval for which the second order Taylor polynomial for ln (1 + x) at x = 0 approximates ln (1 + x) with an absolute error of no more than 0.04. 389) ______

A) $-0.1928 \le x \le 0.7063$ B) $-0.4310 \le x \le 0.5525$
C) $-0.5525 \le x \le 0.5525$ D) $-0.5525 \le x \le 0.2640$

Find the sum of the series as a function of x.

390) $\sum_{n=0}^{\infty}\left(\frac{x^2+5}{6}\right)^n$ 390) ______

A) $\frac{6}{x^2+1}$ B) $\frac{6}{x^2-1}$ C) $-\frac{6}{x^2-1}$ D) $-\frac{6}{x^2+1}$

Find the values of x for which the geometric series converges.

391) $\sum_{n=0}^{\infty}(5x+1)^n$ 391) ______

A) $-\frac{2}{5}<x<0$ B) $-\frac{1}{5}<x<\frac{1}{5}$ C) $0<x<\frac{2}{5}$ D) $0<x<\frac{1}{5}$

Find the interval of convergence of the series.

392) $\sum_{n=1}^{\infty}\frac{(x-3)^n}{(4n)!}$ 392) ______

A) $x \le 4$ B) $-\infty<x<\infty$ C) $2 \le x \le 4$ D) $-21 \le x \le 27$

Use the ratio test to determine if the series converges or diverges.

393) $\sum_{n=1}^{\infty}\frac{(2n)!}{2^n\, n!}$ 393) ______

A) Diverges B) Converges

Find the Maclaurin series for the given function.

394) e^{7x} 394) ______

A) $\sum_{n=1}^{\infty}\frac{7^n x^n}{n!}$ B) $\sum_{n=1}^{\infty}\frac{(-1)^n 7^n x^n}{n!}$

C) $\sum_{n=0}^{\infty}\frac{(-1)^n 7^n x^n}{n!}$ D) $\sum_{n=0}^{\infty}\frac{7^n x^n}{n!}$

395) $f(x)=\frac{x^4}{1+7x}$ 395) ______

A) $\sum_{n=0}^{\infty}(-1)^{n+1}7^n x^{n+5}$ B) $\sum_{n=0}^{\infty}(-1)^n 7^n x^{n+5}$

C) $\sum_{n=0}^{\infty}(-1)^{n+1}7^n x^{n+4}$ D) $\sum_{n=0}^{\infty}(-1)^n 7^n x^{n+4}$

Use the root test to determine if the series converges or diverges.

396) $\sum_{n=1}^{\infty}\left(\frac{\ln n}{7n+2}\right)^n$ 396) ______

A) Diverges B) Converges

Find the Maclaurin series for the given function.

397) $\sin 5x$ 397) ______

A) $\sum_{n=0}^{\infty}\frac{(-1)^{2n+1}5^{2n+1}x^{2n+1}}{n!}$ B) $\sum_{n=0}^{\infty}\frac{(-1)^n 5^{2n+1}x^{2n+1}}{(2n+1)!}$

C) $\sum_{n=0}^{\infty}\frac{(-1)^{2n+1}5^{2n+1}x^{2n+1}}{(2n+1)!}$ D) $\sum_{n=0}^{\infty}\frac{(-1)^n 5^{2n+1}x^{2n+1}}{n!}$

Find a formula for the nth term of the sequence.

398) −9, −8, −7, −6, −5 (integers beginning with −9) 398) ______

A) $a_n = n-9$ B) $a_n = n+9$ C) $a_n = n-8$ D) $a_n = n-10$

Find the Taylor polynomial of order 3 generated by f at a.

399) $f(x)=e^{-5x}$, $a=0$ 399) ______

A) $1-25x+\frac{625x^2}{2}-\frac{15{,}625x^3}{12}$ B) $1-5x+\frac{25x^2}{2}-\frac{125x^3}{3}$

C) $1-5x+\frac{25x^2}{2}-\frac{125x^3}{18}$ D) $1-5x+\frac{25x^2}{2}-\frac{125x^3}{6}$

400) $f(x)=x^2+x+1$, $a=4$ 400) ______

A) $1+3(x-4)+3(x-4)^2+(x-4)^3$ B) $21+9(x-4)+(x-4)^2$

C) $21+9(x-4)+9(x-4)^2+21(x-4)^3$ D) $5+9(x-4)+13(x-4)^2$

Find the limit of the sequence if it converges; otherwise indicate divergence.

401) $a_n=\sqrt[n]{3^n \cdot n}$ 401) ______

A) 0 B) 1 C) 3 D) Diverges

Solve the problem.

402) You plan to estimate e by evaluating the Maclaurin series for $f(x)=e^x$ at $x=1$. How many terms of the series would you have to add to be sure the estimate is good to3 decimal places? 402) ______

A) 10 B) 8 C) 9 D) 11

403) If $\sum a_n$ is a convergent series of nonnegative terms, what can be said about $\sum a_n{}^k$, where k is a positive integer? 403) ______

A) May converge or diverge B) Always converges C) Always diverges

Find the sum of the geometric series for those x for which the series converges.

404) $\sum_{n=0}^{\infty}\frac{(-1)^n}{3}\frac{1}{(9+\sin x)^n}$ 404) ______

A) $\frac{9+\sin x}{3(10+\sin x)}$ B) $\frac{9+\sin x}{3(10-\sin x)}$ C) $\frac{3+\sin x}{9(10-\sin x)}$ D) $\frac{3+\sin x}{9(10+\sin x)}$

Solve the problem.

405) A company makes a very durable product. It sells 20,000 in the first year, but will have dimishing sales due to the product's durability, so that each year it can expect to sell only seventy-five percent of the quantity it will have sold the year before. How many of the product can the company expect to eventually sell? 405) ______

A) 40,000 B) 80,000 C) 35,000 D) 26,667

Use the root test to determine if the series converges or diverges.

406) $\sum_{n=1}^{\infty}\frac{n^n}{9^{n^2}}$ 406) ______

A) Converges B) Diverges

Answer the question.

407) Suppose that $a_n>0$ and $b_n>0$ for all $n \ge N$ (N an integer). If $\lim_{n\to\infty}\frac{a_n}{b_n}=\infty$, what can you conclude about the convergence of $\sum a_n$? 407) ______

A) $\sum a_n$ diverges if $\sum b_n$ diverges

B) The convergence of a_n cannot be determined.

C) $\sum a_n$ diverges if $\sum b_n$ diverges, and $\sum a_n$ converges if $\sum b_n$ converges

D) $\sum a_n$ converges if $\sum b_n$ converges

Solve the problem.

408) If $p>0$ and $q>1$, what can be said about the convergence of 408) ______

$\sum_{n=2}^{\infty}\frac{1}{n^p(\ln n)^q}$?

A) Always converges B) Always diverges C) May converge or diverge

Use the integral test to determine whether the series converges.

409) $\sum_{n=1}^{\infty}\frac{14}{n}$ 409) ______

A) converges B) diverges

Determine convergence or divergence of the series.

410) $\sum_{n=1}^{\infty}n^6 e^{-n}$ 410) ______

A) Converges B) Diverges

Use partial fractions to find the sum of the series.

411) $\sum_{n=1}^{\infty}\left(\frac{1}{3^{1/(n+1)}}-\frac{1}{3^{1/n}}\right)$ 411) ______

A) 1 B) The series diverges.

C) $-\frac{1}{3}$ D) $1-\frac{1}{3}$

Estimate the magnitude of the error involved in using the sum of the first four terms to approximate the sum of the entire series.

412) $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}(0.4)^n}{n}$ 412) ______

A) 6.40×10^{-3} B) 6.83×10^{-4} C) 2.05×10^{-3} D) 1.02×10^{-2}

Use the limit comparison test to determine if the series converges or diverges.

413) $\sum_{n=1}^{\infty}\frac{10\sqrt{n}}{8n^{3/2}+7n-8}$ 413) ______

A) Diverges B) Converges

Determine if the sequence is bounded.

414) $a_n=\frac{4^n}{5^n n!}$ 414) ______

A) not bounded B) bounded

Solve the problem.

415) For approximately what values of x can sin x be replaced by $x-\frac{x^3}{6}+\frac{x^5}{120}$ with an error of magnitude no greater than 5×10^{-5}? 415) ______

A) $|x|<0.82127$ B) $|x|<0.79476$ C) $|x|<0.63837$ D) $|x|<0.59235$

Determine either absolute convergence, conditional convergence or divergence for the series.

416) $\sum_{n=1}^{\infty}(-1)^n\left(\frac{8n^8+6}{4n^9+5}\right)$ 416) ______

A) Converges absolutely B) Diverges C) Converges conditionally

Solve the problem.

417) Using the Maclaurin series for $\tan^{-1}x$, obtain a series for $\frac{\tan^{-1}x^2}{x^2}$. 417) ______

A) $\sum_{n=0}^{\infty}\frac{(-1)^n x^{4n}}{2n+2}$ B) $\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n}}{2n+1}$ C) $\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n}}{2n+2}$ D) $\sum_{n=0}^{\infty}\frac{(-1)^n x^{4n}}{2n+1}$

418) For approximately what values of x can sin x be replaced by $x-\frac{x^3}{6}$ with an error of magnitude no greater than 5×10^{-5}? 418) ______

A) $|x|<0.26052$ B) $|x|<0.18612$ C) $|x|<0.27832$ D) $|x|<0.35944$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than 10^{-3}.

419) $F(x)=\int_0^x e^{-t^2}\,dt$, $[0, 0.5]$ 419) ______

A) $x-\frac{x^3}{3}+\frac{x^5}{15}$ B) $x+\frac{x^3}{3}+\frac{x^5}{5}$ C) $x-\frac{x^3}{3}+\frac{x^5}{10}$ D) $x-\frac{x^3}{3}+\frac{x^5}{5}$

Solve the problem.

420) Derive the series for $\frac{1}{1-x}$ for $x > 1$ by first writing $\frac{1}{1-x} = \frac{1}{x}\frac{1}{1-1/x}$. 420) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^n}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n}{x^{n+1}}$ C) $\sum_{n=0}^{\infty} \frac{1}{x^n}$ D) $\sum_{n=0}^{\infty} \frac{1}{x^{n+1}}$

Find the Fourier series expansion for the given function.

421) $f(x) = x^2, \quad -\pi \le x \le \pi$ 421) ______

A) $f(x) = \frac{\pi^2}{3} - 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos(2n-1)x}{(2n-1)^2}$ B) $f(x) = \frac{\pi^2}{3} - 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n^2}$

C) $f(x) = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos(2n-1)x}{(2n-1)^2}$ D) $f(x) = \frac{\pi^2}{3} + 4\sum_{n=1}^{\infty} \frac{(-1)^n \cos nx}{n^2}$

Determine convergence or divergence of the series.

422) $\sum_{n=1}^{\infty} \frac{5}{n^{7/4}}$ 422) ______

A) Diverges B) Converges

Use partial fractions to find the sum of the series.

423) $\sum_{n=1}^{\infty} \frac{6n}{(2n-1)^2(2n+1)^2}$ 423) ______

A) $\frac{9}{4}$ B) 5 C) 7 D) $\frac{3}{4}$

Solve the problem.

424) Obtain the first nonzero term of the Maclaurin series for sin(tan x) − tan(sin x). 424) ______

A) $-\frac{x^7}{30}$ B) $-\frac{x^7}{60}$ C) $\frac{x^7}{30}$ D) $\frac{x^7}{60}$

Use series to evaluate the limit.

425) $\lim_{x\to 0} \frac{\tan^{-1} 6x - \tan 6x}{x^3}$ 425) ______

A) − 12 B) − 72 C) − 54 D) − 144

Find the Maclaurin series for the given function.

426) $f(x) = \frac{x^{10}}{1-3x}$ 426) ______

A) $\sum_{n=0}^{\infty} 3^n x^{n+10}$ B) $\sum_{n=0}^{\infty} (-1)^n 3{>}n\, x^{n+11}$

C) $\sum_{n=0}^{\infty} 3^n x^{n+11}$ D) $\sum_{n=0}^{\infty} (-1)^{n+1} 3^n x^{n+10}$

Solve the problem.

427) Find the sum of the series $\sum_{n=1}^{\infty} \frac{n}{2^{n-1}}$ by expressing $\frac{1}{1-x}$ as a geometric series, differentiating both sides of the resulting equation with respect to x, and replacing x by $\frac{1}{2}$. 427) ______

A) $\frac{9}{4}$ B) 4 C) $\frac{1}{4}$ D) $\frac{4}{9}$

428) Mari drops a ball from a height of 21 meters and notices that on each bounce the ball returns to about 8/9 of its previous height. About how far will ball travel before it comes to rest? 428) ______

A) 44.6 meters B) 378 meters C) 189 meters D) 357 meters

429) Use the Alternating Series Estimation Theorem to estimate the error that results from replacing e^{-x} by $1 - x + \frac{x^2}{2}$ when $0 < x < 0.4$. 429) ______

A) 0.01067 B) 0.00427 C) 0.02133 D) −0.01067

Find a series solution for the initial value problem.

430) $y' - 2y = 1, \; y(0) = \frac{1}{2}$ 430) ______

A) $y = \frac{3}{2} + \sum_{n=1}^{\infty} \frac{2^n x^n}{n!}$ B) $y = \frac{1}{2} + \sum_{n=1}^{\infty} \frac{2^n x^n}{n!}$

C) $y = 1 + \sum_{n=1}^{\infty} \frac{2^n x^n}{n!}$ D) $y = \frac{3}{4} + \sum_{n=1}^{\infty} \frac{2^n x^n}{n!}$

Use the limit comparison test to determine if the series converges or diverges.

431) $\sum_{n=1}^{\infty} \frac{1}{8\sqrt{n} + 5(\ln n)^2}$ 431) ______

A) Converges B) Diverges

Find the Fourier series expansion for the given function.

432) $f(x) = \begin{cases} 0, & -\pi \le x \le 0 \\ \sin x, & 0 \le x \le \pi \end{cases}$ 432) ______

A) $f(x) = \frac{1}{\pi} + \frac{\sin x}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos 2nx}{4n^2 - 1}$ B) $f(x) = \frac{1}{\pi} + \frac{\cos x}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin 2nx}{4n^2 + 1}$

C) $f(x) = \frac{1}{\pi} + \frac{\sin x}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\cos 2nx}{4n^2 + 1}$ D) $f(x) = \frac{1}{\pi} + \frac{\cos x}{2} - \frac{2}{\pi}\sum_{n=1}^{\infty} \frac{\sin 2nx}{4n^2 - 1}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

433) $\frac{8}{1\cdot 3} + \frac{8}{2\cdot 4} + \frac{8}{3\cdot 5} + \ldots + \frac{8}{n(n+2)} + \ldots$ 433) ______

A) $\frac{8n(3n+4)}{4n(n+1)}$; 6 B) $\frac{8n(3n+4)}{4n(n+2)}$; 6

C) $\frac{8n(3n+5)}{4n(n+2)}$; 6 D) $\frac{8n(3n+5)}{4(n+1)(n+2)}$; 6

Find the Maclaurin series for the given function.

434) $f(x) = x^8 \cos \pi x$ 434) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n} x^{2n+8}}{(2n)!}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n+8} x^{2n+8}}{(2n+16)!}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n} x^{2n+8}}{(2n+16)!}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n+8} x^{2n+8}}{(2n)!}$

Determine either absolute convergence, conditional convergence or divergence for the series.

435) $\sum_{n=1}^{\infty} (-1)^n \ln\left[\frac{4n+4}{3n+3}\right]$ 435) ______

A) Converges conditionally B) Converges absolutely C) Diverges

Find the sum of the series as a function of x.

436) $\sum_{n=0}^{\infty} (x+5)^n$ 436) ______

A) $\frac{1}{x-4}$ B) $-\frac{1}{x-4}$ C) $\frac{1}{x+4}$ D) $-\frac{1}{x+4}$

Determine whether the nonincreasing sequence converges or diverges.

437) $a_n = \frac{6^{n+1} + 4^n}{n \cdot 6^n}$ 437) ______

A) Diverges B) Converges

Solve the problem.

438) Obtain the first nonzero term of the Maclaurin series for sin x − tan x. 438) ______

A) $-\frac{x^3}{2}$ B) $\frac{x^3}{2}$ C) $-\frac{x^3}{3}$ D) $\frac{x^3}{3}$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

439) $F(x) = \int_0^x \tan^{-1} t^2 \, dt$, [0, 0.75] 439) ______

A) $\frac{x^3}{3} - \frac{x^7}{7}$ B) $\frac{x^3}{3} - \frac{x^7}{21} + \frac{x^{11}}{33}$ C) $\frac{x^3}{3} - \frac{x^7}{21}$ D) $\frac{x^3}{3} - \frac{x^7}{21} + \frac{x^{11}}{231}$

Solve the problem.

440) If $\sum a_n$ is a convergent series of nonnegative terms, what can be said about $\sum a_n a_{n+1}$? 440) ______

A) May converge or diverge B) Always diverges C) Always converges

Use the limit comparison test to determine if the series converges or diverges.

441) $\sum_{n=1}^{\infty} \frac{5 + 3\ln n}{3 + 8n(\ln n)^3}$ 441) ______

A) Diverges B) Converges

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

442) $2 + \frac{2}{3} + \frac{2}{9} + \ldots + \frac{2}{3^{n-1}} + \ldots$ 442) ______

A) $\frac{2\left(1 - \frac{1}{3^n}\right)}{1 - \frac{1}{3}}$; $\frac{3}{2}$ B) $\frac{2\left(1 - \frac{1}{3^n}\right)}{1 - \frac{1}{3}}$; 3 C) $\frac{2\left(1 - \frac{1}{3^{n-1}}\right)}{1 - \frac{1}{3}}$; 3 D) $\frac{2\left(1 - \frac{1}{3^{n-1}}\right)}{1 - \frac{1}{3}}$; $\frac{3}{2}$

Use series to evaluate the limit.

443) $\lim_{x\to 0} \frac{\sin 9x - \tan 9x}{x^3}$ 443) ______

A) $-\frac{9}{2}$ B) −9 C) $-\frac{729}{2}$ D) $-\frac{81}{2}$

Find a formula for the nth term of the sequence.

444) 8, −8, 8, −8, 8 (8's with alternating signs) 444) ______

A) $a_n = 8(-1)^{n+1}$ B) $a_n = 8(-1)^{2n-1}$ C) $a_n = 8(-1)^{2n+1}$ D) $a_n = 8(-1)^n$

Find the Maclaurin series for the given function.

445) $f(x) = x^5 \sin x$ 445) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n 5^n x^{2n}}{(2n+6)!}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n 5^n x^{2n}}{(2n+1)!}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+6}}{(2n+6)!}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+6}}{(2n+1)!}$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

446) $a_1 = 3, \; a_{n+1} = -a_n$ 446) ______

A) 3, −9, 27, −81, 243 B) 3, −3, 3, −3, 3

C) −3, 3, −3, 3, −3 D) 3, 0, −3, −6, −9

Find the sum of the geometric series for those x for which the series converges.

447) $\sum_{n=0}^{\infty} (x+5)^n$ 447) ______

A) $\frac{1}{-4+x}$ B) $\frac{1}{6-x}$ C) $\frac{1}{-4-x}$ D) $\frac{1}{6+x}$

Find the interval of convergence of the series.

448) $\sum_{n=0}^{\infty} \frac{(x-2)^n}{n^3 2^n}$ 448) ______

A) $x < 4$ B) $-4 < x < 4$ C) $1 \le x \le 3$ D) $0 \le x \le 4$

Solve the problem.

449) If sin x is replaced by $x - \frac{x^3}{6} + \frac{x^5}{120}$ and $|x| < 0.6$, what estimate can be made of the error? 449) ______

A) $|E| < 0.000038880$ B) $|E| < 0.000064800$
C) $|E| < 0.000009257$ D) $|E| < 0.000005554$

Write the first four elements of the sequence.

450) $\left(\frac{1}{3}\right)^n$ 450) ______

A) $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}$ B) $\frac{1}{3}, -\frac{1}{9}, \frac{1}{27}, -\frac{1}{81}$ C) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$ D) $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}$

Solve the problem.

451) If the series $\sum_{n=0}^{\infty} (-1)^n (x-10)^n$ is integrated twice term by term, for what value(s) of x (if any) does the new series converge and for which the given series does not converge? 451) ______

A) x = 9 B) x = 11 C) x = 9, x = 11 D) None

Find the Maclaurin series for the given function.

452) cos 4x 452) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^{2n} 4^{2n} x^{2n}}{(2n)!}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^{2n} 4^{2n} x^{2n}}{n!}$
C) $\sum_{n=0}^{\infty} \frac{(-1)^{n} 4^{2n} x^{2n}}{n!}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^{n} 4^{2n} x^{2n}}{(2n)!}$

Use the ratio test to determine if the series converges or diverges.

453) $\sum_{n=1}^{\infty} n!\, e^{-6n}$ 453) ______

A) Diverges B) Converges

Determine if the series defined by the formula converges or diverges.

454) $a_1 = 6, a_{n+1} = \frac{8n-7}{9n+4} a_n$ 454) ______

A) Diverges B) Converges

Find the quadratic approximation of f at x = 0.

455) f(x) = tan 6x 455) ______

A) $Q(x) = 1 + 3x^2$ B) $Q(x) = 1 - 3x^2$ C) $Q(x) = 1 + 6x^2$ D) $Q(x) = 6x$

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

456) $a_1 = 1, a_2 = 4, a_{n+2} = a_{n+1} + a_n$ 456) ______

A) 1, 4, 5, 10, 15 B) 1, 4, 5, 6, 7 C) 1, 4, 5, 9, 14 D) 1, 1, 2, 3, 5

Find the smallest value of N that will make the inequality hold for all n > N.

457) $\frac{5^n}{n!} < 10^{-2}$ 457) ______

A) 13 B) 14 C) 15 D) 16

Solve the problem.

458) Find the sum of the infinite series 458) ______

$1 + 6r + 9r^2 + 6r^3 + r^4 + 6r^5 + 9r^6 + 6a^7 + r^8 \ldots$

for those values of r for which it converges.

A) $\frac{6r^3 + 9r^2 + 6r + 1}{1 - r^4}$ B) $\frac{6r^3 + 9r^2 + 6r + 9}{1 - r^4}$
C) $\frac{9r^3 + 6r^2 + 9r + 6}{1 - r^4}$ D) $\frac{9r^3 + 6r^2 + 9r + 1}{1 - r^4}$

Find the values of x for which the geometric series converges.

459) $\sum_{n=0}^{\infty} 4^n x^n$ 459) ______

A) $|x| < 4$ B) $|x| < 8$ C) $|x| < \frac{1}{4}$ D) $|x| < 1$

Solve the problem.

460) If p > 1 and q > 1, what can be said about the convergence of 460) ______

$\sum_{n=2}^{\infty} \frac{1}{n^p (\ln n)^q}$?

A) May converge or diverge B) Always converges C) Always diverges

Find the limit of the sequence if it converges; otherwise indicate divergence.

461) $a_n = \frac{\ln(n+9)}{n^{1/n}}$ 461) ______

A) 1 B) 0 C) ln 9 D) Diverges

Find the interval of convergence of the series.

462) $\sum_{n=0}^{\infty} \frac{(x-7)^{2n}}{4^n}$ 462) ______

A) $6 < x < 8$ B) $5 < x < 9$ C) $x < 9$ D) $-9 < x < 9$

Write the first four elements of the sequence.

463) $\left(1 + \frac{1}{n}\right)^n$ 463) ______

A) $0, 1, \frac{9}{4}, \frac{64}{27}$ B) $1, \frac{9}{4}, \frac{64}{27}, \frac{625}{64}$ C) $0, 2, \frac{9}{4}, \frac{64}{27}$ D) $2, \frac{9}{4}, \frac{64}{27}, \frac{625}{256}$

Find a formula for the nth partial sum of the series and use it to find the series' sum if the series converges.

464) $\frac{4}{3\cdot1} + \frac{4}{5\cdot3} + \frac{4}{7\cdot5} + \ldots + \frac{4}{(2n+1)(2n-1)} + \ldots$ 464) ______

A) $\frac{4n}{n+2}; 4$ B) $\frac{4n}{2(n+1)}; 2$ C) $\frac{8n}{2n+1}; 4$ D) $\frac{4n}{2n+1}; 2$

Solve the problem.

465) For what values of x can we replace cos x by $1 - \frac{x^2}{2}$ with an error of magnitude no greater than 9×10^{-3}? 465) ______

A) $-0.436 \le x \le 0.436$ B) $-0.682 \le x \le 0.682$
C) $-0.600 \le x \le 0.600$ D) $-0.378 \le x \le 0.378$

Find the sum of the series.

466) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{5}{9^n}$ 466) ______

A) $\frac{1}{2}$ B) $\frac{5}{8}$ C) $\frac{45}{8}$ D) $\frac{9}{2}$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

467) $F(x) = \int_0^x e^{-t^2}\, dt$, [0, 1] 467) ______

A) $x - \frac{x^3}{3} + \frac{x^5}{10} - \frac{x^7}{42}$ B) $x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9}$
C) $x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7}$ D) $x - \frac{x^3}{3} + \frac{x^5}{10} - \frac{x^7}{42} + \frac{x^9}{216}$

Find a series solution for the initial value problem.

468) $(1 + x)y' - 6y = 0, y(0) = 1$ 468) ______

A) $y = \sum_{n=1}^{\infty} \binom{6}{n-1} x^n$ B) $y = \sum_{n=0}^{\infty} \binom{6}{n} x^n$
C) $y = \sum_{n=0}^{\infty} n\binom{6}{n} x^n$ D) $y = \sum_{n=1}^{\infty} n\binom{6}{n-1} x^n$

Find the quadratic approximation of f at x = 0.

469) $f(x) = \frac{x}{\sqrt{4 - x^2}}$ 469) ______

A) $Q(x) = 1 + 2x$ B) $Q(x) = 1 + \frac{x}{2}$ C) $Q(x) = \frac{x}{2}$ D) $Q(x) = 2x$

Find the Maclaurin series for the given function.

470) $\frac{1}{2 + x}$ 470) ______

A) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{2^n}$ B) $\sum_{n=1}^{\infty} \frac{(-1)^n x^n}{2^{n+1}}$
C) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{2^n}$ D) $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{2^{n+1}}$

Use the ratio test to determine if the series converges or diverges.

471) $\sum_{n=1}^{\infty} \frac{(2n)!}{2^n (n!)^2}$ 471) ______

A) Diverges B) Converges

A recursion formula and the initial term(s) of a sequence are given. Write out the first five terms of the sequence.

472) $a_1 = 1, a_{n+1} = a_n^{2}$ 472) ______

A) 1, 2, 4, 8, 16 B) 1, 3, 5, 7, 9 C) 1, 2, 4, 8, 16, 32 D) 1, 1, 1, 1, 1

Find the values of x for which the geometric series converges.

473) $\sum_{n=0}^{\infty} (-1)^n \left(\frac{x-7}{6}\right)^n$ 473) ______

A) $5 < x < 19$ B) $-5 < x < 19$ C) $-13 < x < 13$ D) $1 < x < 13$

Find the Taylor polynomial of lowest degree that will approximate F(x) throughout the given interval with an error of magnitude less than than 10^{-3}.

474) $F(x) = \int_0^x \sin t^3\, dt$, [0, 1] 474) ______

A) $\frac{x^4}{4} - \frac{x^{10}}{60}$ B) $x^3 - \frac{x^7}{6}$ C) $\frac{x^4}{4} - \frac{x^8}{48}$ D) $x^3 - \frac{x^9}{6}$

Write the first four elements of the sequence.

475) $\frac{n+1}{3n-1}$ 475) ______

A) $-1, 1, \frac{3}{5}, \frac{1}{2}$ B) $0, \frac{1}{3}, \frac{1}{2}, \frac{3}{4}$ C) $\frac{1}{3}, \frac{1}{2}, \frac{3}{4}, \frac{2}{3}$ D) $1, \frac{3}{5}, \frac{1}{2}, \frac{5}{11}$

Estimate the magnitude of the error involved in using the sum of the first four terms to approximate the sum of the entire series.

476) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} t^n}{n}$, $-1 < t \le 1$ 476) ______

A) $\left|\frac{t^5}{5}\right|$ B) 0.20 C) $|t^5|$ D) $\left|\frac{t^4}{4}\right|$

Find the Taylor series generated by f at x = a.

477) $f(x) = -2x + 1,\ a = -5$ 477) ______

A) $-2(x - 5) + 11$ B) $-2(x + 5) + 11$ C) $-2(x + 5) + 9$ D) $-2(x - 5) + 9$

Find the sum of the series.

478) $\sum_{n=0}^{\infty} \left(\frac{9}{7^n} + \frac{2}{3^n}\right)$ 478) ______

A) $\frac{75}{8}$ B) $\frac{15}{2}$ C) $\frac{27}{2}$ D) $\frac{51}{8}$

Find the Taylor series generated by f at x = a.

479) $f(x) = \frac{1}{x},\ a = 5$ 479) ______

A) $\sum_{n=0}^{\infty} \frac{(x-5)^n}{5^{n+1}}$ B) $\sum_{n=0}^{\infty} \frac{(-1)^n (x-5)^n}{5^{n+1}}$

C) $\sum_{n=0}^{\infty} \frac{(-1)^n (x-5)^n}{5^n}$ D) $\sum_{n=0}^{\infty} \frac{(x-5)^n}{5^n}$

Solve the problem.

480) Use the fact that 480) ______

$$\tan x = x + \frac{x^3}{3} + \frac{2x^5}{15} + \frac{17x^7}{315} + \ldots$$

for $|x| < \frac{\pi}{2}$ to find the first four terms of the series for $\ln(\cos x)$.

A) $-\left(1 + x^2 + \frac{2x^4}{3} + \frac{17x^6}{45} + \ldots\right)$ B) $\frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \frac{17x^8}{2520} + \ldots$

C) $-\left(\frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \frac{17x^8}{2520} + \ldots\right)$ D) $1 + x^2 + \frac{2x^4}{3} + \frac{17x^6}{45} + \ldots$

Determine whether the nonincreasing sequence converges or diverges.

481) $a_n = \frac{1 + \sqrt{10n}}{n}$ 481) ______

A) Converges B) Diverges

For what values of x does the series converge absolutely?

482) $\sum_{n=1}^{\infty} \frac{(x+9)^n}{\sqrt{n}}$ 482) ______

A) $x = 9$ B) $x = -9$ C) $x = \pm 9$ D) $-10 < x < -8$

Determine if the series defined by the formula converges or diverges.

483) $a_1 = 8,\ a_{n+1} = \frac{5 + \tan^{-1} n}{n} a_n$ 483) ______

A) Diverges B) Converges

1) D
2) C
3) A
4) A
5) A
6) A
7) D
8) A
9) A
10) B
11) C
12) A
13) C
14) C
15) C
16) A
17) B
18) C
19) C
20) B
21) C
22) D
23) D
24) C
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31) B
32) A
33) A
34) D
35) C
36) D
37) B
38) B
39) A
40) A
41) A
42) D
43) A
44) B
45) B
46) A
47) D
48) B
49) B
50) C

51) A
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57) A
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