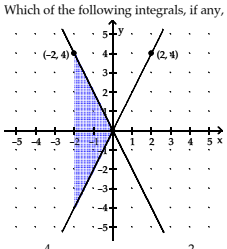
Exam

Name_____

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

Answer each question appropriately.

1) Which of the following integrals, if any, calculates the area of the shaded region? 1)



A) $\int_{-4}^{4} -4x\,dx$ B) $\int_{-2}^{2} 4x\,dx$ C) $\int_{-2}^{0} 4x\,dx$ D) $\int_{-2}^{0} -4x\,dx$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

2) What values of a and b minimize the value of $\int_a^b (x^6 - 4x^4)\,dx$? 2) _____

3) Use the max–min inequality to show that $1 \le \int_0^1 \sqrt{1+x^4}\,dx \le 2$. 3) _____

4) A plane averaged 300 mph on a 600 mile trip and then returned over the same 600 miles at the rate of 400 mph. What was the plane's average speed for the entire trip? Give reasons for your answer. 4) _____

5) Use the max–min inequality to find upper and lower bounds for $\int_1^2 \frac{1}{x}\,dx$ and $\int_2^3 \frac{1}{x}\,dx$. 5) _____

Add these to arrive at an estimate of $\int_1^3 \frac{1}{x}\,dx$.

6) Explain why the rule $\int_a^b dx = b - a$ holds for any constants a and b. 6) _____

7) Use the max–min inequality to find upper and lower bounds for the value of $\int_1^3 \frac{1}{x}\,dx$. 7) _____

8) Derive a formula for the area of a circumscribed regular n–sided polygon for a circle of radius r. 8) _____

9) Use the max–min inequality to show that if f is integrable and $f(x) \le 0$ on [a, b], then $\int_a^b f(x)\,dx \le 0$. 9) _____

10) What values of a and b maximize the value of $\int_a^b (6x - 3x^2)\,dx$? 10) _____

11) Integrate $\int \csc^2 x \cot x\,dx$ using the substitution $u = \cot x$ and using the substitution $u = \csc x$. Show the results are the same. 11) _____

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

Solve the problem.

12) Suppose that f has a positive derivative for all values of x and that f(2) = 0. Which of the following statements must be true of the function $g(x) = \int_0^x f(t)\,dt$? 12) _____

A) The graph of g crosses the x–axis at x = 2.
B) The function g has a local minimum at x = 2.
C) The function g has a local maximum at x = 2.
D) The graph of g has an inflection point at x = 2.

Write the sum without sigma notation and evaluate it.

13) $\sum_{k=1}^{2} \frac{8k}{k+17}$ 13) _____

A) $\frac{8}{1+17} + \frac{8}{2+17} = \frac{148}{171}$ B) $\frac{8}{1+17} + \frac{16}{2+17} = \frac{24}{37}$

C) $\frac{8}{1+17} + \frac{16}{2+17} = \frac{220}{171}$ D) $\frac{8}{1+17} + \frac{16}{2+17} = \frac{64}{171}$

Evaluate the integral using the given substitution.

14) $\int 21(7x-3)^{-5}\,dx$, $u = 7x - 3$ 14) _____

A) $-\frac{3}{4}(7x-3)^{-4} + C$ B) $-\frac{1}{2}(7x-3)^{-6} + C$

C) $(7x-3)^{-4} + C$ D) $-\frac{3}{2}(7x-3)^{-4} + C$

Write the sum without sigma notation and evaluate it.

15) $\sum_{k=1}^{4} 2\cos\frac{\pi}{k}$ 15) _____

A) $2\cos\pi + 2\cos\frac{\pi}{2} + 2\cos\frac{\pi}{3} + 2\cos\frac{\pi}{4} = -1 + \sqrt{2}$

B) $2\cos\pi + 2\cos\frac{\pi}{4} = -2 + \sqrt{2}$

C) $2\cos\pi + 2\cos\frac{\pi}{2} + 2\cos\frac{\pi}{3} + 2\cos\frac{\pi}{4} = 3 + \sqrt{2}$

D) $2\cos\pi + 2\cos\frac{\pi}{2} + 2\cos\frac{\pi}{3} + 2\cos\frac{\pi}{4} = -2 + \sqrt{3} + \sqrt{2}$

Evaluate the integral.

16) $\int_{\pi/2}^{3\pi/2} 11\cos x\,dx$ 16) _____

A) –22 B) –11 C) 11 D) 22

Find the value of the specified finite sum.

17) Given $\sum_{k=1}^{n} a_k = -5$ and $\sum_{k=1}^{n} b_k = 6$, find $\sum_{k=1}^{n} (a_k + b_k)$. 17) _____

A) –1 B) 30 C) –30 D) 1

Solve the initial value problem.

18) $\frac{dy}{dx} = x(2+x^2)^2$, $y(0) = 0$ 18) _____

A) $y = \frac{1}{6}(2+x^2)^3$ B) $y = \frac{1}{6}(2+x^2)^3 - \frac{4}{3}$

C) $y = \frac{1}{3}(2+x^2)^3 - \frac{8}{3}$ D) $y = \frac{1}{3}(2+x^2)^3$

Estimate the value of the quantity.

19) A swimming pool has a leak. The leak is getting worse. The following table gives the leak rate every 6 hours. 19) _____

Time (hr)	Leakage (gal/hour)
0	0
6	0.5
12	0.7
18	1.1
24	2.4
30	4.5
36	5.6
42	6.0
48	6.4

Suppose it keeps leaking 6.4 gallons every 6 hours. After losing 2900 gallons the leak is fixed. Approximately how long did the leak last? Use the right endpoints to estimate the first 48 hours.

A) –86.20 hours B) 54.78 hours C) 33.03 hours D) 27.03 hours

Evaluate the integral using the given substitution.

20) $\int \frac{12s^3\,ds}{\sqrt{6-s^4}}$, $u = 6 - s^4$ 20) _____

A) $\frac{6s^4}{\sqrt{6-s^4}}$ B) $-6s^3\sqrt{6-s^4} + C$ C) $\frac{-3}{2\sqrt{6-s^4}} + C$ D) $-6\sqrt{6-s^4} + C$

Evaluate the integral by using multiple substitutions.

21) $\int \frac{3\sin^2\sqrt{3y+3}\cos\sqrt{3y+3}}{2\sqrt{3y+3}}\,dy$ 21) _____

A) $\frac{\sqrt{3y+3}^3}{3} + C$ B) $\frac{\sin^3\sqrt{3y+3}}{18} + C$

C) $2\sin\sqrt{3y+3} + C$ D) $\frac{\sin^3\sqrt{3y+3}}{3} + C$

Solve the problem.

22) After a new firm starts in business, it finds that its rate of profits (in hundreds of dollars per year) after t years of operation is given by $\frac{dP}{dt} = 3t^2 + 6t + 4$. Find the profit in year 3 of the operation. 22) _____

A) $4700 B) $2800 C) $4800 D) $3800

Estimate the value of the quantity.

23) A piece of tissue paper is picked up in gusty wind. The table shows the velocity of the paper at 2 second intervals. Estimate the distance the paper travelled using left–endpoints. 23) _____

Time (sec)	Velocity (ft/sec)
0	0
2	8
4	12
6	6
8	26
10	31
12	21
14	10
16	2

A) 116 ft B) 212 ft C) 209 ft D) 232 ft

Find the area enclosed by the given curves.

24) $y = -4\sin x$, $y = \sin 2x$, $0 \le x \le \pi$ 24) _____

A) 16 B) 4 C) 8 D) $\frac{1}{2}$

Solve the initial value problem.

25) $\frac{dr}{d\theta} = \csc^2 15\theta \cot 15\theta, \quad r\left(\frac{\pi}{4}\right) = 3$ 25) _____

A) $r = -\frac{1}{30}\cot^2 15\theta + \frac{91}{30}$ B) $r = -\frac{1}{30}\tan^2 15\theta + \frac{91}{30}$

C) $r = \frac{1}{6}\csc^3 15\theta \cot^2 15\theta + 3$ D) $r = \frac{1}{30}\cot^2 \theta + \frac{89}{30}$

Graph the integrand and use areas to evaluate the integral.

26) $\int_0^3 10x\, dx$ 26) _____

A) $\frac{9}{2}$ B) 90 C) 45 D) 30

Estimate the value of the quantity.

27) Joe wants to find out how far it is across the lake. His boat has a speedometer but no odometer. The table shows the boats velocity at 10 second intervals. Estimate the distance across the lake using right-end point values. 27) _____

Time (sec)	Velocity (ft/sec)
0	0
10	12
20	30
30	56
40	53
50	58
60	55
70	58
80	48
90	15
100	0

A) 3950 ft B) 5800 ft C) 3850 ft D) 385 ft

Solve the initial value problem.

28) $\frac{d^2s}{dt^2} = -128\cos(8t), \; s'(0) = 6, \; s(0) = 8$ 28) _____

A) $s = 16\cos(8t) + 6t - 8$ B) $s = 2\cos(8t) + 6t + 6$

C) $s = 2\cos(8t) + 6$ D) $s = -16\sin(8t) + 6$

29) $\frac{dy}{dx} = x^4(x^5 - 5)^2, \quad y(1) = 5$ 29) _____

A) $y = \frac{1}{5}(x^5 - 5)^1 + \frac{29}{5}$ B) $y = \frac{1}{15}x^{15} - 5 + \frac{8}{5}$

C) $y = \frac{1}{15}(x^5 - 5)^3 + \frac{139}{15}$ D) $y = \frac{1}{3}(x^5 - 5)^3 + \frac{19}{15}$

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

30) $f(t) = 2 - \left(\cos\frac{\pi t}{2}\right)^2$ on [0, 4] divided into 4 subintervals 30) _____

A) $\frac{3}{2}$ B) $\frac{2 - \sqrt{2}}{2}$ C) 2 D) 0

Evaluate the integral.

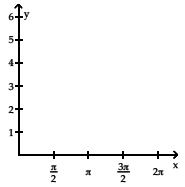
31) $\int \frac{x\, dx}{(7x^2 + 3)^5}$ 31) _____

A) $-\frac{1}{56}(7x^2 + 3)^{-4} + C$ B) $-\frac{7}{3}(7x^2 + 3)^{-6} + C$

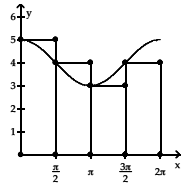
C) $-\frac{7}{3}(7x^2 + 3)^{-4} + C$ D) $-\frac{1}{14}(7x^2 + 3)^{-6} + C$

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

32) $f(x) = \cos x + 4$, $[0, 2\pi]$, midpoint 32)



A)



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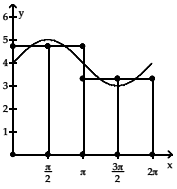
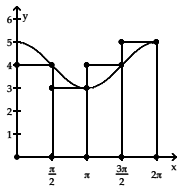
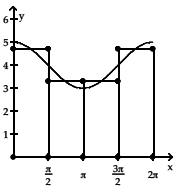


C)



D)



Solve the initial value problem.

33) $\frac{dy}{dx} = \frac{9}{(4 + x)^2}, \; y(0) = 4$ 33) _____

A) $y = \frac{9}{4 + x} + 4$ B) $y = \frac{-9}{4 + x} + \frac{25}{4}$ C) $y = \frac{9}{4 + x} + \frac{7}{4}$ D) $y = \frac{-9}{4 + x} + 4$

Evaluate the integral.

34) $\int_{-\pi/4}^{3\pi/4} 9\sec\theta \tan\theta\, d\theta$ 34) _____

A) $9\sqrt{2}$ B) 0 C) $-18\sqrt{2}$ D) $-9\sqrt{2}$

35) $\int_1^5 7\, dx$ 35) _____

A) 7 B) 42 C) −7 D) 28

Graph the integrand and use areas to evaluate the integral.

36) $\int_{-3}^{3} (2x + 6)\, dx$ 36) _____

A) 36 B) 18 C) 12 D) 72

Find the average value of the function over the given interval.

37) $f(x) = 10x$ on $[7, 9]$ 37) _____

A) 40 B) 80 C) 160 D) 320

Use the substitution formula to evaluate the integral.

38) $\int_0^1 (8y^2 - y + 1)^{-1/3}(32y - 2)\, dy$ 38) _____

A) 4 B) 12 C) $\frac{9}{2}$ D) 9

Find the derivative.

39) $y = \int_{x^4}^{0} \cos\sqrt{t}\, dt$ 39) _____

A) $-\sin(x^2)$ B) $4x^3\cos(x^2)$ C) $-4x^3\cos(x^2)$ D) $1 - \cos(x^2)$

Find the total area of the region between the curve and the x-axis.

40) $y = \frac{1}{\sqrt{x}}; \; 1 \le x \le 4$ 40) _____

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

Evaluate the integral by using multiple substitutions.

41) $\int \frac{6\tan^2 x \sec^2 x}{(1 + \tan^3 x)^2}\, dx$ 41) _____

A) $\frac{2\tan^3 x \sec^3 x}{3 + \tan^3 x} + C$ B) $\frac{2}{1 + \cot^3 x} + C$

C) $\frac{-2}{1 + \tan^3 x} + C$ D) $\frac{6x^2}{(1 + x^3)^2} + C$

Find the value of the specified finite sum.

42) Given $\sum_{k=1}^{n} a_k = -6$, find $\sum_{k=1}^{n} 6\, a_k$. 42) _____

A) 1 B) −1 C) 36 D) −36

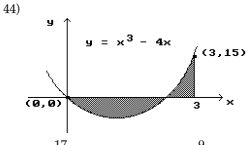
Express the limit as a definite integral where P is a partition of the given interval.

43) $\lim_{\|P\| \to 0} \sum_{k=1}^{n} \frac{9}{c_k^5}\,\Delta x_k, \; [3, 4]$ 43) _____

A) $\int_1^n \frac{9}{x}\, dx$ B) $\int_4^3 \frac{9}{x^5}\, dx$ C) $\int_3^4 \frac{9}{x^5}\, dx$ D) $\int_3^4 \frac{9}{x}\, dx$

Find the area of the shaded region.

44) 44) _____



A) $\frac{17}{4}$ B) $\frac{9}{4}$ C) $\frac{41}{4}$ D) $\frac{33}{4}$

Solve the problem.

45) Find $f(\pi)$ if $\int_0^x f(t)\,dt = x \sin 6x$. 45) _____

A) 0 B) 6π C) π D) 6

Use the substitution formula to evaluate the integral.

46) $\int_{\pi/6}^{\pi/2} \cot x \csc^3 x\,dx$ 46) _____

A) $-\frac{7}{3}$ B) $\frac{15}{4}$ C) $-\frac{15}{4}$ D) $\frac{7}{3}$

Solve the problem.

47) Given the acceleration, initial velocity, and initial position of a body moving along a coordinate line at time t, find the body's position at time t.
$a = 32$, $v(0) = -4$, $s(0) = -7$ 47) _____

A) $s = 16t^2 - 4t$ B) $s = 16t^2 - 4t - 7$ C) $s = -16t^2 + 4t - 7$ D) $s = 32t^2 - 4t - 7$

Evaluate the integral by using multiple substitutions.

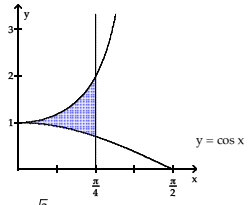
48) $\int \frac{6y \sin^3\sqrt{3y^2+4}\cos\sqrt{3y^2+4}}{\sqrt{3y^2+4}}\,dy$ 48) _____

A) $\frac{1}{2}\sin^4\sqrt{3y^2+4} + C$ B) $6\sin^2\sqrt{3y^2+4} + C$

C) $2\sin^4\sqrt{3y^2+4} + C$ D) $\frac{1}{2}\cos^4\sqrt{6y} + C$

Find the area of the shaded region.

49) $y = \sec^2 x$ 49)



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

Solve the problem.

50) Suppose that f and g are continuous and that $\int_3^7 f(x)\,dx = -2$ and $\int_3^7 g(x)\,dx = 8$. 50) _____

Find $\int_3^7 [5f(x) + g(x)]\,dx$.

A) 30 B) 13 C) 38 D) -2

51) Suppose that $\int_{-7}^{-4} g(t)\,dt = -10$. Find $\int_{-7}^{-4} \frac{g(x)}{-10}\,dx$ and $\int_{-4}^{-7} -g(t)\,dt$. 51) _____

A) -1; 10 B) 1; -10 C) 1; 10 D) 0; -10

Express the limit as a definite integral where P is a partition of the given interval.

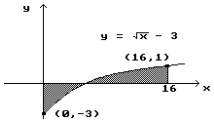
52) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} \left(\cos\frac{c_k}{2}\right)\Delta x_k$, $[0, 3\pi]$ 52) _____

A) $\int_0^{3\pi} \left(\cos\frac{x}{2}\right)dx$ B) $\int_0^{3\pi} \left(-\frac{1}{2}\sin\frac{x}{2}\right)dx$

C) $\int_1^n \cos x\,dx$ D) $\int_{3\pi}^0 \left(\cos\frac{x}{2}\right)dx$

Find the area of the shaded region.

53) 53) _____



A) $\frac{22}{3}$ B) $\frac{29}{3}$ C) $\frac{16}{3}$ D) $\frac{38}{3}$

Solve the problem.

54) What definite integral is represented by $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{4i}{n}\right)^2 \frac{4}{n}$? Use the Fundamental Theorem to evaluate the integral. 54) _____

A) $\int_1^4 x^2\,dx = 21$ B) $\int_0^4 x^2\,dx = \frac{64}{3}$ C) $\int_0^4 x^3\,dx = 64$ D) $\int_0^1 4x^2\,dx = \frac{4}{3}$

Graph the integrand and use areas to evaluate the integral.

55) $\int_{-1}^{6} 4\,dx$ 55) _____

A) 7 B) 14 C) 20 D) 28

Solve the initial value problem.

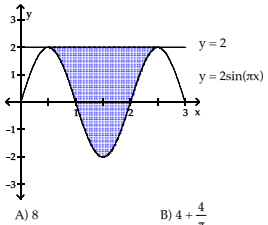
56) $\frac{dy}{dx} = \cot x$, $y(-2) = 7$ 56) _____

A) $y = \int_7^x \cot t\,dt + -2$ B) $y = \int_{-2}^x \cot t\,dt + 7$

C) $y = -\int_{-2}^x \csc^2 t\,dt + 7$ D) $y = \int_x^{-2} \cot t\,dt + 7$

Find the area of the shaded region.

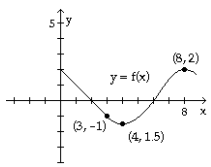
57) 57)



A) 8 B) $4 + \frac{4}{\pi}$ C) $\frac{4}{\pi}$ D) 4

Solve the problem.

58) Let f be the differentiable function whose graph is shown in the figure. (Note that the function is linear for $0 \le x \le 3$.) The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s = \int_0^t f(x)\,dx$. Use the graph to answer the questions. Explain your answers. For what values of t is the particle moving to the left? 58) _____



A) $2 < x < 6$ B) $2 < x < 8$ C) $3 < x < 8$ D) $1 < x < 5$

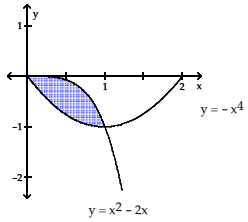
Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

59) $f(x) = \frac{1}{x}$ between $x = 3$ and $x = 8$ using a lower sum with two rectangles of equal width. 59) _____

A) $\frac{1885}{30976}$ B) $-\frac{43}{66}$ C) $\frac{5655}{30976}$ D) $-\frac{43}{33}$

Find the area of the shaded region.

60) 60)

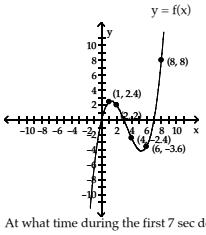


A) 2 B) $\frac{7}{15}$ C) $\frac{76}{15}$ D) $\frac{22}{15}$

Solve the problem.

61) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\,dx$ feet. 61)

y = f(x)

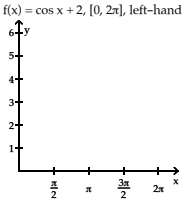


At what time during the first 7 sec does s have its smallest value?

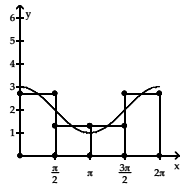
A) 7 sec B) 5 sec C) 3 sec D) 6 sec

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

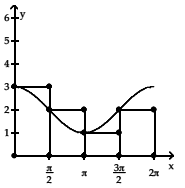
62) f(x) = cos x + 2, [0, 2π], left-hand endpoint 62)



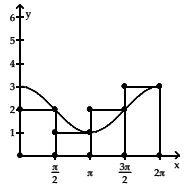
A)



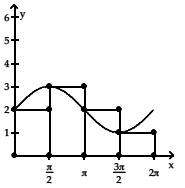
B)



C)



D)



Estimate the value of the quantity.

63) A hat is dropped from a hot air balloon. The hat falls faster and faster but its acceleration decreases over time due to air resistance. The acceleration is measured every second after the drop for 6 seconds. Find an upper estimate for the speed when t = 8 seconds. 63) _____

Time (sec)	Acceleration (ft/sec^2)
0	32.00
1	16.96
2	8.99
3	4.76
4	2.52
5	1.34
6	0.71

A) 66.58 ft/sec B) 35.29 ft/sec C) 192 ft/sec D) 32.05 ft/sec

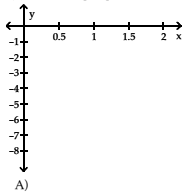
Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

64) f(x) = 25 − x^2 between x = −5 and x = 5 using the "midpoint rule" with two rectangles of equal width. 64) _____

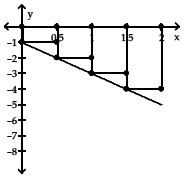
A) 10 B) 187.5 C) 93.75 D) 62.5

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

65) f(x) = −2x − 1, [0, 2], left-hand endpoint 65)



A)



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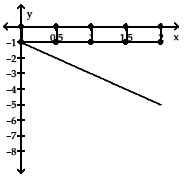

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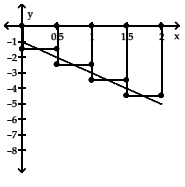
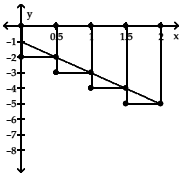


D)



Use a definite integral to find an expression that represents the area of the region between the given curve and the x-axis on the interval [0, b].

66) $y = 24x^2$ 66) _____

A) −48b B) $8b^3$ C) $-8b^3$ D) 48b

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

67) $f(x) = 3(2)^x$ on [1, 7] divided into 3 subintervals 67) _____

A) 84 B) 168 C) 42 D) 252

Graph the integrand and use areas to evaluate the integral.

68) $\int_{-2}^{7} |x|\,dx$ 68) _____

A) $\frac{45}{2}$ B) $\frac{53}{2}$ C) 9 D) 53

Find the formula and limit as requested.

69) For the function $f(x) = 10 - 4x^2$, find a formula for the lower sum obtained by dividing the interval [0, 1] into n equal subintervals. Then take the limit as $n \to \infty$ to calculate the area under the curve over [0, 1]. 69) _____

A) $10 + \frac{4n^3 + 6n^2 + 2}{3n^3}$; Area = $\frac{34}{3}$ B) $10 - \frac{4n^3 + 6n^2 + 2n}{3n^3}$; Area = $\frac{26}{3}$

C) $\frac{4n^3 + 6n^2 + 2n}{3n^3}$; Area = $\frac{4}{3}$ D) $10 - \frac{8n^3 + 12n^2 + 4n}{3n^3}$; Area = $\frac{26}{3}$

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

70) $f(x) = 3x^5$ on [1, 3] divided into 4 subintervals 70) _____

A) 103.8 B) 175.8 C) 58.6 D) 703.2

Use the substitution formula to evaluate the integral.

71) $\int_{-1}^{0} \frac{3t}{(3 + t^2)^4}\,dt$ 71) _____

A) $-\frac{37}{3456}$ B) $\frac{37}{3456}$ C) $-\frac{37}{576}$ D) $-\frac{37}{1728}$

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

72) $f(x) = x^2$ between x = 0 and x = 4 using an upper sum with two rectangles of equal width. 72) _____

A) 40 B) 38.75 C) 8 D) 20

Find the derivative.

73) $y = \int_{0}^{x^6} \cos\sqrt{t}\,dt$ 73) _____

A) $6x^5 \cos(x^3)$ B) $\sin(x^3)$ C) $\cos(x^3)$ D) $\cos(x^3) - 1$

Find the average value of the function over the given interval.

74) f(x) = |x| + 2 on [−3, 3] 74) _____

A) 7 B) $\frac{7}{6}$ C) $\frac{7}{2}$ D) 21

75) f(x) = −2x + 12 on [−12, 6] 75) _____

A) 36 B) 324 C) 6 D) 18

76) f(x) = 2x + 12 on [−6, 6] 76) _____

A) 144 B) 24 C) 6 D) 12

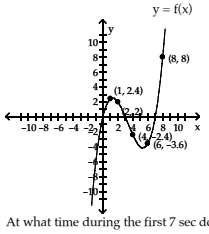
Graph the integrand and use areas to evaluate the integral.

77) $\int_{-5}^{5} (5 - |x|)\,dx$ 77) _____

A) $\frac{25}{2}$ B) 50 C) 75 D) 25

Solve the problem.

78) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\,dx$ feet. 78)



At what time during the first 7 sec does s have its smallest value?

A) 7 sec B) 3 sec C) 6 sec D) 5 sec

Express the limit as a definite integral where P is a partition of the given interval.

79) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} (\sec^2 c_k)\,\Delta x_k,\ [-4\pi, 4\pi]$ 79) _____

A) $\int_{-4\pi}^{4\pi} \sec^2 x\,dx$ B) $\int_{1}^{n} \sec x\,dx$ C) $\int_{4\pi}^{-4\pi} \sec^2 x\,dx$ D) $\int_{-4\pi}^{4\pi} \tan x\,dx$

Evaluate the integral.

80) $\int_0^5 \left(2x^2 + x + 2\right)\,dx$ 80) _____

A) $\frac{95}{2}$ B) $\frac{635}{6}$ C) $\frac{625}{3}$ D) 32

Evaluate the integral using the given substitution.

81) $\int 27(y^6 + 4y^3 + 1)^3(2y^5 + 4y^2)\,dy$, $u = y^6 + 4y^3 + 1$ 81) _____

A) $\frac{27}{4}(y^6 + 4y^3 + 1)^4 + C$ B) $\frac{27}{4}(y^6 + 4y^3 + 1)^4(10y^4 + 8y) + C$

C) $27(y^6 + 4y^3 + 1)^2 + C$ D) $\frac{9}{4}(y^6 + 4y^3 + 1)^4 + C$

Express the limit as a definite integral where P is a partition of the given interval.

82) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} (\sec c_k \tan c_k)\,\Delta x_k,\ [0, 5\pi]$ 82) _____

A) $\int_1^n (\sec x)\,dx$ B) $\int_{5\pi}^{0} (\sec x \tan x)\,dx$

C) $\int_0^{5\pi} (\sec x \tan x)\,dx$ D) $\int_0^{5\pi} (\sec x)\,dx$

Find the total area of the region between the curve and the x–axis.

83) $y = 2x + 7;\ 1 \le x \le 5$ 83) _____

A) 18 B) 9 C) 52 D) 26

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

84) $f(x) = \frac{1}{x}$ between x = 2 and x = 7 using a upper sum with two rectangles of equal width. 84) _____

A) $\frac{485}{15876}$ B) $-\frac{13}{21}$ C) $-\frac{13}{42}$ D) $\frac{485}{5292}$

Evaluate the integral.

85) $\int x^4(x^5 - 8)^4\,dx$ 85) _____

A) $\frac{(x^5 - 8)^5}{5} + C$ B) $\frac{(x^5 - 8)^5}{25} + C$ C) $(x^5 - 8)^5 + C$ D) $\frac{(x^5 - 8)^3}{15} + C$

Answer each question appropriately.

86) Suppose the area of the region between the graph of a positive continuous function f and the x–axis from x = a to x = b is 4 square units. Find the area between the curves y = f(x) and y = 2f(x). 86) _____

A) 4 square units B) 8 square units C) –4 square units D) 12 square units

Solve the problem.

87) Given the acceleration, initial velocity, and initial position of a body moving along a coordinate line at time t, find the body's position at time t. 87) _____

a = 12 cos 3t, v(0) = –8, s(0) = –13

A) $s = -\frac{4}{3}\sin 3t - 8t - 13$ B) $s = \frac{4}{3}\cos 3t + 8t - 13$

C) $s = -\frac{4}{3}\cos 3t - 8t - 13$ D) $s = \frac{4}{3}\sin 3t - 8t - 13$

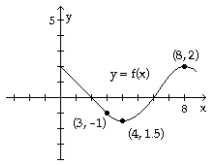
Find the total area of the region between the curve and the x–axis.

88) $y = (x + 1)^3;\ 0 \le x \le 3$ 88) _____

A) 64 B) 255 C) 45 D) $\frac{255}{4}$

Solve the problem.

89) Let f be the differentiable function whose graph is shown in the figure. (Note that the function is linear for $0 \le x \le 3$.) The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s = \int_0^t f(x)\,dx$. Use the graph to answer the questions. Explain your answers. Approximately when is the acceleration zero? 89) _____



A) t = 8 sec B) t = 2 sec and t = 5 sec

C) t = 4 sec and t = 6 sec D) t = 4 sec and t = 8 sec

Evaluate the integral.

90) $\int_0^{\pi} \frac{7 - \sin 4x}{4}\,dx$ 90) _____

A) $\frac{7\pi}{4}$ B) $-\frac{7\pi}{4}$ C) $\frac{7\pi}{4} + \frac{1}{8}$ D) $\frac{7\pi}{4} - \frac{1}{8}$

91) $\int_0^{\sqrt[3]{13}} x^2\,dx$ 91) _____

A) 169 B) $\frac{13\sqrt{13}}{3}$ C) $\frac{13}{3}$ D) $\frac{\sqrt[3]{13}}{3}$

Find the formula and limit as requested.

92) For the function f(x) = 4x + 2, find a formula for the upper sum obtained by dividing the interval [0, 3] into n equal subintervals. Then take the limit as $n \to \infty$ to calculate the area under the curve over [0, 3]. 92) _____

A) $6 + \frac{36n^2 + 36n}{2n^2}$; Area = 24 B) $6 + \frac{36n^2 + 36n}{2n^2}$; Area = $\frac{48}{5}$

C) $6 - \frac{36n^2 + 36n}{2n^2}$; Area = – 12 D) $6 + \frac{33n^2 + 37n}{2n^2}$; Area = $\frac{9}{2}$

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

93) $f(x) = \frac{1}{x}$ between x = 4 and x = 8 using the "midpoint rule" with two rectangles of equal width. 93) _____

A) $\frac{12}{35}$ B) $\frac{148}{3675}$ C) $\frac{74}{1225}$ D) $\frac{24}{35}$

Use the substitution formula to evaluate the integral.

94) $\int_0^1 \sqrt{x + 16}\,dx$ 94) _____

A) $\frac{34}{3}\sqrt{17}$ B) $\frac{34}{3}\sqrt{17} - \frac{128}{3}$ C) $\frac{51}{2}\sqrt{17} - \frac{51}{2}$ D) $17\sqrt{17} - 64$

Evaluate the integral.

95) $\int_{\pi/4}^{3\pi/4} -6\csc^2 x\,dx$ 95) _____

A) 12 B) 0 C) –6 D) –12

Find the average value of the function over the given interval.

96) f(x) = 10 – x on [0, 10] 96) _____

A) 5 B) 500 C) 50 D) 10

Answer each question appropriately.

97) If differentiable functions y = F(x) and y = G(x) both solve the initial value problem $\frac{dy}{dx} = f(x)$, $y(x_0) = y_0$, on an interval I, must F(x) = G(x) for every x in I? Justify the answer. 97) _____

A) F(x) = G(x) for every x in I because when given an initial condition, we can find the integration constant when integrating f(x). Therefore, the particular solution to the initial value problem is unique.

B) F(x) = G(x) for every x in I because integrating f(x) results in one unique function.

C) There is not enough information given to determine if F(x) = G(x).

D) F(x) and G(x) are not unique. There are infinitely many functions that solve the initial value problem. When solving the problem there is an integration constant C that can be any value. F(x) and G(x) could each have a different constant term.

Use the substitution formula to evaluate the integral.

98) $\int_{\pi/4}^{3\pi/4} \left(3 + \cot\theta\right)\csc^2\theta\,d\theta$ 98) _____

A) 3 B) –3 C) 6 D) 12

Evaluate the integral using the given substitution.

99) $\int x\cos(8x^2)\,dx$, $u = 8x^2$ 99) _____

A) $\sin(8x^2) + C$ B) $\frac{1}{u}\sin(u) + C$ C) $\frac{1}{16}\sin(8x^2) + C$ D) $\frac{x^2}{2}\sin(8x^2) + C$

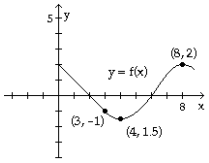
Solve the problem.

100) Given the velocity and initial position of a body moving along a coordinate line at time t, find the body's position at time t. 100) _____

v = –20t + 5, s(0) = 8

A) $s = -10t^2 + 5t - 8$ B) $s = 10t^2 + 5t - 8$ C) $s = -10t^2 + 5t + 8$ D) $s = -20t^2 + 5t + 8$

101) Let f be the differentiable function whose graph is shown in the figure. (Note that the function is linear for $0 \le x \le 3$.) The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s = \int_0^t f(x)\,dx$. Use the graph to answer the questions. Explain your answers. What is the position of the particle at t = 3 sec? 101) _____



A) 2 m B) .5 m C) 1.5 m D) 1 m

102) Suppose that f is continuous and that $\int_{-4}^{4} f(z)\,dz = 0$ and $\int_{-4}^{6} f(z)\,dz = 8$. Find $\int_{6}^{4} f(x)\,dx$. 102) _____

A) –8 B) 8 C) –16 D) 16

Find the formula and limit as requested.

103) For the function $f(x) = 4x^2 + 2$, find a formula for the upper sum obtained by dividing the interval [0, 3] into n equal subintervals. Then take the limit as $n \to \infty$ to calculate the area under the curve over [0, 3]. 103) _____

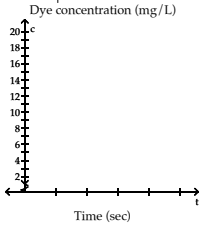
A) $6 + \frac{216n^3 + 324n^2 + 108n}{6n^4}$; Area = 6 B) $6 + \frac{216n^3 + 324n^2 + 108n}{6n^3}$; Area = 42

C) $6 + \frac{216n^3 + 324n^2 + 108n}{6n^3}$; Area = 36 D) $6 + \frac{216n^3 + 324n^2 + 108n}{6n^4}$; Area = 42

Estimate the value of the quantity.

104) The table gives dye concentrations for a cardiac–output determination. The amount of dye injected was 5.3 mg. Plot the data and connect the data points with a smooth curve. Find the area under the curve using rectangles. Use this area to estimate the cardiac output. 104)

Seconds after injection	Dye Conc. (adjusted for recirculation)
0	0
2	0.5
4	1.2
6	2.3
8	3.8
10	4.6
12	4.5
14	3.2
16	1.8
18	0.5
20	0



A) 7.3 L/min B) 247.9 L/min C) 0.1 L/min D) 14.5 L/min

Write the sum without sigma notation and evaluate it.

105) $\sum_{k=1}^{3} (-1)^{k+1} \cos 2k\pi$ 105) _____

A) $\cos 2\pi - \cos 4\pi + \cos 6\pi = -1$ B) $-\cos 2\pi + \cos 4\pi - \cos 6\pi = -1$

C) $\cos 2\pi + \cos 6\pi = 2$ D) $\cos 2\pi - \cos 4\pi + \cos 6\pi = 1$

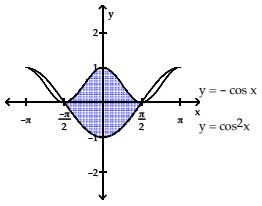
Evaluate the integral.

106) $\int_0^2 (x + 4)^3\,dx$ 106) _____

A) 324 B) 1040 C) 260 D) 60

Find the area of the shaded region.

107) 107)



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

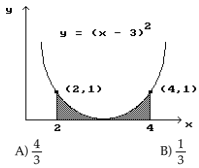
Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

108) $f(x) = x^2 - 3$ on [–3, 7] divided into 5 subintervals 108) _____

A) $\frac{57}{5}$ B) 45 C) 12 D) 9

Find the area of the shaded region.

109) 109) _____



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

Find the total area of the region between the curve and the x–axis.

110) $y = \frac{3}{x^3}$; $1 \le x \le 3$ 110) _____

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

Solve the problem.

111) Suppose that $\int_2^3 f(x)\,dx = -3$. Find $\int_2^3 7f(u)\,du$ and $\int_2^3 -f(u)\,du$. 111) _____

A) –21; 3 B) –21; $-\frac{1}{3}$ C) 4; –3 D) 7; 3

Graph the integrand and use areas to evaluate the integral.

112) $\int_{-6}^{3} (-2x + 6)\,dx$ 112) _____

A) 27 B) 108 C) 81 D) 162

Evaluate the integral by using multiple substitutions.

113) $\int 4(3x^2 - 5)\sin^5(x^3 - 5x)\cos(x^3 - 5x)\,dx$ 113) _____

A) $\frac{2}{3}\cos^6(3x^2) + C$ B) $\frac{3}{2}\sin^6(x^3 - 5x) + C$

C) $20\sin^4(x^3 - 5x) + C$ D) $\frac{2}{3}\sin^6(x^3 - 5x) + C$

Evaluate the integral.

114) $\int_{-3}^{6} 5x^4\,dx$ 114) _____

A) 243 B) 8019 C) 40,095 D) –8019

Find the total area of the region between the curve and the x–axis.

115) $y = x^2(x - 2)^2$; $0 \le x \le 2$ 115) _____

A) $\frac{17}{15}$ B) $\frac{15}{16}$ C) $\frac{15}{17}$ D) $\frac{16}{15}$

Graph the integrand and use areas to evaluate the integral.

116) $\int_{-4}^{4} \sqrt{16 - x^2}\,dx$ 116) _____

A) 8π B) 4π C) 16π D) 16

Evaluate the integral.

117) $\int \frac{1}{t^2}\sin\left(\frac{8}{t} + 4\right)dt$ 117) _____

A) $-\frac{1}{8}\cos\left(\frac{8}{t} + 4\right) + C$ B) $\frac{1}{8}\cos\left(\frac{8}{t} + 4\right) + C$

C) $8\cos\left(\frac{8}{t} + 4\right) + C$ D) $-\cos\left(\frac{8}{t} + 4\right) + C$

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

118) $f(t) = 2e^{-t}\cos 2\pi t$ on [–2, 3] divided into 5 subintervals (Round to the nearest hundredth.) 118) _____

A) –14.82 B) 2.82 C) –2.82 D) –38.29

Express the limit as a definite integral where P is a partition of the given interval.

119) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} \sqrt{c_k^2 + 4}\ \Delta x_k$, $[-6, 7]$ 119) _____

A) $\int_1^n \sqrt{x^2+4}\ dx$ B) $\int_7^{-6} \sqrt{x^2+4}\ dx$

C) $\int_{-6}^7 \sqrt{x^2+4}\ dx$ D) $\int_{-6}^7 \sqrt{x+4}\ dx$

120) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} 8c_k^7\ \Delta x_k$, $[6, 8]$ 120) _____

A) $\int_6^8 56x^6\ dx$ B) $\int_1^n 8x\ dx$ C) $\int_6^8 8x^7\ dx$ D) $\int_8^6 8x^7\ dx$

Evaluate the integral.

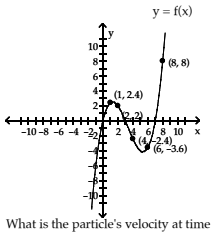
121) $\int 8x^2 \sqrt[4]{3+2x^3}\ dx$ 121) _____

A) $\frac{16}{15}(3+2x^3)^{5/4} + C$ B) $8(3+2x^3)^{5/4} + C$

C) $-\frac{16}{3}(3+2x^3)^{-3/4} + C$ D) $\frac{32}{5}(3+2x^3)^{5/4} + C$

Solve the problem.

122) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\ dx$ feet. 122)



What is the particle's velocity at time t = 6?

A) 1.8 ft/sec B) 0 ft/sec C) −3.6 ft/sec D) 3.6 ft/sec

Evaluate the integral.

123) $\int_2^{\sqrt{11}} x\ dx$ 123) _____

A) $\sqrt{11} - 2$ B) $-\frac{7}{2}$ C) 7 D) $\frac{7}{2}$

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

124) $f(x) = \frac{4}{x}$ on $\left[\frac{1}{2}, \frac{11}{2}\right]$ divided into 5 subintervals 124) _____

A) $\frac{5}{2}$ B) $\frac{137}{75}$ C) 3 D) $\frac{137}{15}$

Express the limit as a definite integral where P is a partition of the given interval.

125) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} (3c_k^2 - 9c_k + 7)\ \Delta x_k$, $[-2, 3]$ 125) _____

A) $\int_{-2}^3 (3x^2 - 9x + 7)\ dx$ B) $\int_1^n (6x - 9)\ dx$

C) $\int_3^{-2} (3x^2 - 9x + 7)\ dx$ D) $\int_{-2}^3 (3x - 9)\ dx$

Find the total area of the region between the curve and the x-axis.

126) $y = -x^2 + 9;\ 0 \le x \le 5$ 126) _____

A) $\frac{10}{9}$ B) $\frac{10}{3}$ C) $\frac{98}{3}$ D) $\frac{5}{9}$

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

127) $f(x) = 5x \sin \pi x$ on $[0, 4]$ divided into 4 subintervals 127) _____

A) $-\frac{5}{2}$ B) 0 C) −10 D) $-\frac{5}{4}$

Evaluate the integral.

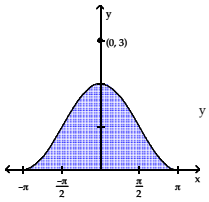
128) $\int \csc^2(6\theta + 8)\ d\theta$ 128) _____

A) $6 \cot(6\theta + 8) + C$ B) $12 \csc(6\theta + 8) \cot(6\theta + 8) + C$

C) $-\frac{1}{6} \cot(6\theta + 8) + C$ D) $-\cot(6\theta + 8) + C$

Find the area of the shaded region.

129) 129)



A) 2 B) 2π C) 2 + 2π D) π

Find the area enclosed by the given curves.

130) $y = \sin x,\ y = \csc^2 x,\ \frac{\pi}{3} \le x \le \frac{\pi}{2}$ 130) _____

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

Write the sum without sigma notation and evaluate it.

131) $\sum_{k=1}^{3} (-1)^k (k-4)^2$ 131) _____

A) $-(1-4)^2 + (2-4)^2 - (3-4)^2 = -6$ B) $(1-4)^2 - (3-4)^2 = -10$

C) $-(1-4)^2 + (2-4)^2 - (3-4)^2 = 6$ D) $-(1-4)^2 - 2(2-4)^2 - 3(3-4)^2 = -20$

Evaluate the integral.

132) $\int_0^{\frac{3\pi}{2}} \theta\ d\theta$ 132) _____

A) $2\pi^2$ B) $\frac{3\pi^2}{8}$ C) π^2 D) $\frac{9\pi^2}{8}$

Find the derivative.

133) $\frac{d}{dx} \int_0^{x^4} \sin t\ dt$ 133) _____

A) $4x^3 \sin(x^4)$ B) $-\cos(x^4) - 1$ C) $\frac{1}{5}x^5 \sin(x^4)$ D) $\sin(x^4)$

Solve the problem.

134) Find the linearization of $f(x) = 7 + \int_1^{x+1} \tan \frac{\pi t}{4}\ dt$ at x = 0. 134) _____

A) 7x + 1 B) x + 7 C) $\sqrt{2}x + 7$ D) 7

Use a definite integral to find an expression that represents the area of the region between the given curve and the x-axis on the interval [0, b].

135) $y = 8x$ 135) _____

A) $-8b$ B) $-4b^2$ C) $8b$ D) $4b^2$

Graph the integrand and use areas to evaluate the integral.

136) $\int_{-7}^{7} (|x| + 6)\ dx$ 136) _____

A) 133 B) 91 C) 182 D) 217

Solve the initial value problem.

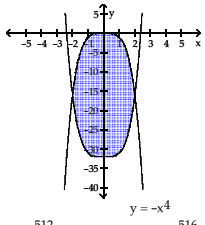
137) $\frac{dy}{dx} = 15 \sin^2 x \cos x,\ y(0) = 3$ 137) _____

A) $y = 30 \sin x \cos x + 3$ B) $y = \frac{15}{2} \cos^2 x + 3$

C) $y = 5 \sin^3 x + 3$ D) $y = -5 \sin^3 x - 3$

Find the area of the shaded region.

138) $y = x^4 - 32$ 138)



A) $\frac{512}{5}$ B) $\frac{516}{5}$ C) $\frac{2816}{5}$ D) $\frac{256}{5}$

Evaluate the integral.

139) $\int_2^{\sqrt{13}} (z - \sqrt{13})\ dz$ 139) _____

A) $-\sqrt{13}$ B) $-\frac{17}{2}\sqrt{13}$ C) $-\frac{17}{2} + 2\sqrt{13}$ D) $-\frac{13}{2}\sqrt{13}$

Write the sum without sigma notation and evaluate it.

140) $\sum_{k=1}^{3} \frac{k+4}{k}$ 140) _____

A) $\frac{1+4}{1} \cdot \frac{2+4}{2} \cdot \frac{3+4}{3} = 35$

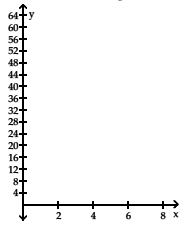
B) $\frac{1+4}{1} + \frac{2+4}{2} + \frac{3+4}{3} = \frac{31}{3}$

C) $\frac{1+4}{1} + \frac{3+4}{3} = \frac{22}{3}$

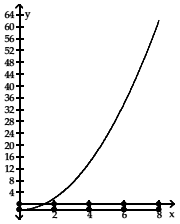
D) $\frac{1+4}{1} + \frac{2+4}{2} + \frac{3+4}{3} = 18$

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

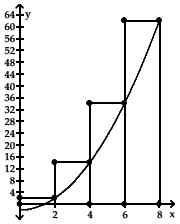
141) $f(x) = x^2 - 2$, [0, 8], right-hand endpoint 141)



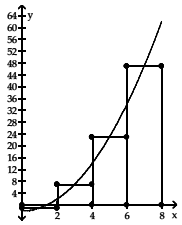
A)



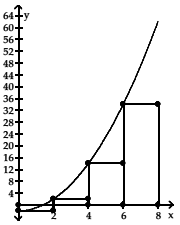
B)



C)



D)



Solve the initial value problem.

142) $\frac{dy}{dx} = 18(6x - 5)^{-3}$, $y(0) = 1$ 142) _____

A) $y = -\frac{3}{2}(6x - 5)^{-2} + 1.06$

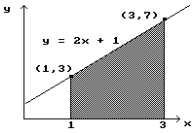
B) $y = (6x - 5)^{-2} - 2.25$

C) $y = -9(6x - 5)^{-2} + 1.06$

D) $y = -\frac{3}{4}(6x - 5)^{-4} + 1.001$

Find the area of the shaded region.

143) 143) _____



A) 10 B) 7.5 C) 5 D) 12.5

Find the area enclosed by the given curves.

144) $y = x$, $y = x^2$ 144) _____

A) $\frac{1}{3}$ B) $\frac{1}{12}$ C) $\frac{1}{6}$ D) $\frac{1}{2}$

Graph the integrand and use areas to evaluate the integral.

145) $\int_5^7 6x\,dx$ 145) _____

A) 12 B) 36 C) 144 D) 72

Write the sum without sigma notation and evaluate it.

146) $\sum_{k=1}^{4} 2\sin\frac{\pi}{k}$ 146) _____

A) $2\sin\pi + 2\sin\frac{\pi}{2} + 2\sin\frac{\pi}{3} + 2\sin\frac{\pi}{4} = 6 + \sqrt{2}$

B) $2\sin\pi + 2\sin\frac{\pi}{4} = \sqrt{2}$

C) $2\sin\pi + 2\sin\frac{\pi}{2} + 2\sin\frac{\pi}{3} + 2\sin\frac{\pi}{4} = 1 + \frac{\sqrt{3}+\sqrt{2}}{2}$

D) $2\sin\pi + 2\sin\frac{\pi}{2} + 2\sin\frac{\pi}{3} + 2\sin\frac{\pi}{4} = 2 + \sqrt{3} + \sqrt{2}$

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

147) $f(x) = x^2$ between x = 0 and x = 4 using a lower sum with two rectangles of equal width. 147) _____

A) 20 B) 8 C) 40 D) 38.75

Use a definite integral to find an expression that represents the area of the region between the given curve and the x-axis on the interval [0, b].

148) $y = 12\pi x^2$ 148) _____

A) $24\pi\, b$ B) $-4>\pi\, b^3$ C) $-24\pi\, b$ D) $4\pi\, b^3$

Find the average value of the function over the given interval.

149) $y = x^2 - 5x + 6$; [0, 9] 149) _____

A) 42 B) $\frac{15}{4}$ C) $\frac{117}{2}$ D) $\frac{21}{2}$

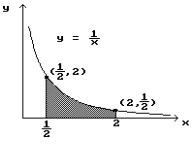
Express the limit as a definite integral where P is a partition of the given interval.

150) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} c_k^3\,\Delta x_k$, [-5, 1] 150) _____

A) $\int_{-5}^{1} 3x^2\,dx$ B) $\int_{-5}^{1} x^3\,dx$ C) $\int_{1}^{-5} x^3\,dx$ D) $\int_{1}^{n} x\,dx$

Find the area of the shaded region.

151) 151) _____



A) 1.39 B) 1.25 C) 1.50 D) 1.69

Solve the problem.

152) Suppose that g is continuous and that $\int_3^6 g(x)\,dx = 10$ and $\int_3^9 g(x)\,dx = 13$. Find $\int_9^6 g(x)\,dx$. 152) _____

A) 3 B) -23 C) 23 D) -3

Find the total area of the region between the curve and the x-axis.

153) $y = (x + 4)\sqrt{x}$; $9 \le x \le 16$ 153) _____

A) $\frac{6166}{15}$ B) $\frac{4349}{2}$ C) 929 D) $\frac{1117}{6}$

Solve the problem.

154) Suppose that $\int_1^x f(t)\,dt = 5x^2 + 8x - 3$. Find f(x). 154) _____

A) $5x^2 + 8x - 3$

B) $\frac{5}{3}x^3 + \frac{5}{3}x^2 - 3x - 10$

C) $10x + 8$

D) $\frac{5}{3}x^3 + 4x^2 - 3x$

Find the total area of the region between the curve and the x-axis.

155) $y = 2x - x^2$; $0 \le x \le 2$ 155) _____

A) $\frac{2}{3}$ B) $\frac{4}{3}$ C) $\frac{7}{3}$ D) $\frac{5}{3}$

Estimate the value of the quantity.

156) The table shows the velocity of a remote controlled race car moving along a dirt path for 8 seconds. Estimate the distance traveled by the car using 8 subintervals of length 1 with left-end point values. 156) _____

Time (sec)	Velocity (in./sec)
0	0
1	10
2	17
3	13
4	23
5	26
6	28
7	12
8	5

A) 129 in. B) 119 in. C) 134 in. D) 258 in.

Use the substitution formula to evaluate the integral.

157) $\int_1^4 \frac{9 - \sqrt{x}}{\sqrt{x}}\,dx$ 157) _____

A) $-\frac{15}{2}$ B) 15 C) 30 D) $\frac{15}{2}$

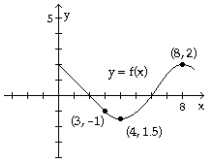
Find the value of the specified finite sum.

158) Given $\sum_{k=1}^{n} a_k = 7$, find $\sum_{k=1}^{n} \frac{a_k}{7}$. 158) _____

A) 1 B) 0 C) –1 D) 49

Solve the problem.

159) Let f be the differentiable function whose graph is shown in the figure. (Note that the function is linear for $0 \le x \le 3$.) The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s = \int_0^t f(x)\,dx$. Use the graph to answer the questions. Explain your answers. What is the velocity of the particle at t = 4 sec? 159) _____



A) – 2.5 m/sec B) 2.5 m/sec C) –1.5 m/sec D) 1.5 m/sec

Evaluate the integral using the given substitution.

160) $\int \frac{11}{x^2}\sin^2\left(\frac{11}{x}\right) dx, \quad u = -\frac{11}{x}$ 160) _____

A) $-\frac{11}{x} + \frac{1}{2}\sin\frac{22}{x} + C$ B) $-\frac{11}{2x} + \frac{1}{4}\sin\frac{22}{x} + C$

C) $\frac{11}{2x} + \frac{1}{2}\sin\frac{11}{x} + C$ D) $-\frac{11}{x} + \sin^3\frac{22}{x} + C$

Find the average value of the function over the given interval.

161) $f(x) = |x|$ on $[-2, 2]$ 161) _____

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

Estimate the value of the quantity.

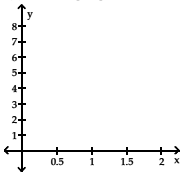
162) The table shows the velocity of a remote controlled race car moving along a dirt path for 8 seconds. Estimate the distance traveled by the car using 8 subintervals of length 1 with right-end point values. 162) _____

Time (sec)	Velocity (in./sec)
0	0
1	8
2	24
3	31
4	30
5	28
6	31
7	26
8	4

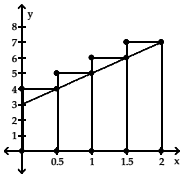
A) 172 in. B) 178 in. C) 182 in. D) 188 in.

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

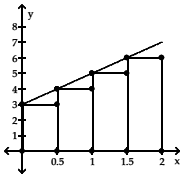
163) f(x) = 2x + 3, [0, 2], left-hand endpoint 163)



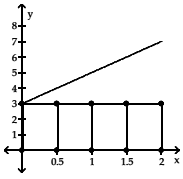
A)



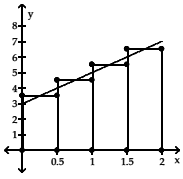
B)



C)



D)



Evaluate the integral using the given substitution.

164) $\int \csc^2 4\theta \cot 4\theta \; d\theta, \quad u = \cot 4\theta$ 164) _____

A) $\frac{1}{6}\csc^3 4\theta \cot^2 4\theta + C$ B) $-\frac{1}{8}\tan^2 4\theta + C$

C) $\frac{1}{8}\cot^2 \theta + C$ D) $-\frac{1}{8}\cot^2 4\theta + C$

Evaluate the integral.

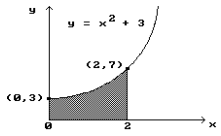
165) $\int \frac{\sin t}{(3 + \cos t)^3}\,dt$ 165) _____

A) $\frac{2}{(3 + \cos t)^2} + C$ B) $\frac{1}{2(3 + \cos t)^2} + C$

C) $\frac{1}{(3 + \cos t)^2} + C$ D) $\frac{1}{4(3 + \cos t)^4} + C$

Find the area of the shaded region.

166) 166) _____



A) $\frac{23}{3}$ B) $\frac{26}{3}$ C) $\frac{22}{3}$ D) $\frac{25}{3}$

Solve the problem.

167) In a certain memory experiment, subject A is able to memorize words at a rate given by 167) _____

$$\frac{dm}{dt} = -0.009t^2 + 0.6t \quad \text{(words per minute).}$$

In the same memory experiment, subject B is able to memorize at the rate given by

$$\frac{dM}{dt} = -0.012t^2 + 0.6t \quad \text{(words per minute).}$$

How many more words does subject B memorize from t = 0 to t = 15 (during the first 15 minutes)?

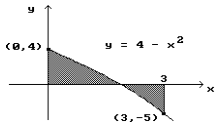
A) –3 B) 54 C) 64 D) –10

Find the area enclosed by the given curves.

168) $y = x^3, \; y = 4x$ 168) _____

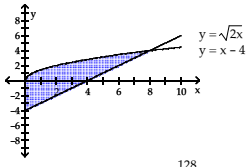
A) 4 B) 16 C) 2 D) 8

Find the area of the shaded region.

169) 

169) _____

A) 5 B) 3 C) $\frac{23}{3}$ D) $\frac{5}{3}$

170) 

170) _____

A) 32 B) $\frac{128}{3}$ C) $\frac{32}{3}$ D) $\frac{64}{3}$

Find the derivative.

171) $y = \int_0^{\sqrt{x}} 7t \cos(t^8)\, dt$ 171) _____

A) $8\sqrt{x}\cos(x^4)$ B) $7\cos(x^4) - 7\sqrt{x}\sin(x^4)$

C) $7\sqrt{x}\cos(x^4)$ D) $\frac{7}{2}\cos(x^4)$

Write the sum without sigma notation and evaluate it.

172) $\sum_{k=1}^{4} \frac{k^2}{4}$ 172) _____

A) $\frac{1^2}{4}\cdot\frac{2^2}{4}\cdot\frac{3^2}{4}\cdot\frac{4^2}{4} = \frac{567}{256}$ B) $\frac{1^2}{4}+\frac{4^2}{4} = \frac{17}{4}$

C) $\frac{1^2}{4}+\frac{2^2}{4}+\frac{3^2}{4}+\frac{4^2}{4} = \frac{15}{8}$ D) $\frac{1^2}{4}+\frac{2^2}{4}+\frac{3^2}{4}+\frac{4^2}{4} = \frac{15}{2}$

173) $\sum_{k=1}^{3} (-1)^k \sin\frac{11\pi}{2}$ 173) _____

A) $-\sin\frac{11\pi}{2} - \sin\frac{11\pi}{2} = 2$ B) $-\sin\frac{11\pi}{2} + \sin\frac{11\pi}{2} - \sin\frac{11\pi}{2} = -1$

C) $-\sin\frac{11\pi}{2} + \sin\frac{11\pi}{2} - \sin\frac{11\pi}{2} = 0$ D) $-\sin\frac{11\pi}{2} + \sin\frac{11\pi}{2} - \sin\frac{11\pi}{2} = 1$

Find the derivative.

174) $y = \int_0^{\tan x} \sqrt{t}\, dt$ 174) _____

A) $\sqrt{\tan x}$ B) $\sec x \tan^{3/2} x$ C) $\sec^2 x\sqrt{\tan x}$ D) $\frac{2}{3}\tan^{3/2} x$

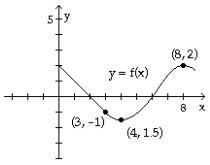
Solve the problem.

175) Suppose that f and g are continuous and that $\int_2^6 f(x)\, dx = -3$ and $\int_2^6 g(x)\, dx = 8$. 175) _____

Find $\int_6^2 [g(x) - f(x)]\, dx$.

A) −5 B) 5 C) 11 D) −11

176) Let f be the differentiable function whose graph is shown in the figure. (Note that the function is linear for $0 \le x \le 3$.) The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s = \int_0^t f(x)\, dx$. Use the graph to answer the questions. Explain your answers. At what time t during the first 9 seconds does s attain its smallest value? 176) _____



A) 7.5 sec B) 6 sec C) 5 sec D) 4.5 sec

Solve the initial value problem.

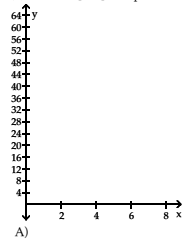
177) $\frac{dy}{dx} = \csc x,\ y(1) = -9$ 177) _____

A) $y = -\int_1^x \csc t \cot t\, dt - 9$ B) $y = \int_1^x \csc t\, dt - 9$

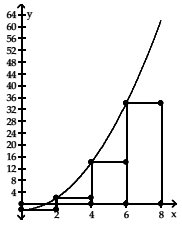
C) $y = \int_x^1 \csc t\, dt - 9$ D) $y = \int_{-9}^x \csc t\, dt + 1$

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

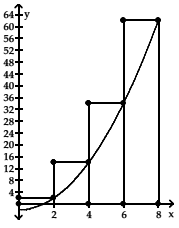
178) f(x) = x² − 2, [0, 8], midpoint 178)



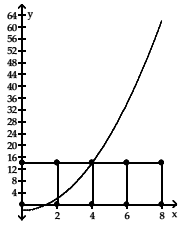
A)



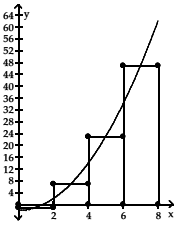
B)



C)



D)



Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

179) f(x) = 5|x| on [−3, 3] divided into 4 subintervals 179) _____

A) 30 B) $\frac{15}{2}$ C) $\frac{10}{3}$ D) $\frac{45}{4}$

Find the average value of the function over the given interval.

180) $y = 5 - x^2;\ [-5, 2]$ 180) _____

A) $-\frac{14}{3}$ B) $\frac{74}{7}$ C) $\frac{24}{7}$ D) $-\frac{4}{3}$

Evaluate the integral by using multiple substitutions.

181) $\int \frac{\sin\sqrt{t}}{\sqrt{t}\cos^3\sqrt{t}}\, dt$ 181) _____

A) $\frac{4}{\sqrt{\cos\sqrt{t}}} + C$ B) $-\frac{4}{\sqrt{\cos t}} + C$ C) $\frac{4}{\sqrt{\sin\sqrt{t}}} + C$ D) $-\frac{2}{t^{3/2}} + C$

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

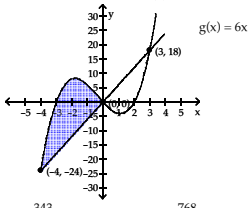
182) $f(x) = x^2$ between x = 1 and x = 5 using a lower sum with four rectangles of equal width. 182) _____

A) 30 B) 41 C) 54 D) 69

Find the area of the shaded region.

183) $f(x) = x^3 + x^2 - 6x$ 183)

$g(x) = 6x$



A) $\frac{343}{12}$ B) $\frac{768}{12}$ C) $\frac{937}{12}$ D) $\frac{81}{12}$

Find the area enclosed by the given curves.

184) $y = \csc^2 x$, $y = \cot^2 x$, $x = \frac{\pi}{4}$, and $x = \frac{3\pi}{4}$ 184) _____

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

Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

185) $f(x) = \frac{\sqrt{x}}{6}$ on [3,7] divided into 4 subintervals (Round to the nearest hundredth.) 185) _____

A) 8.89 B) 1.48 C) 0.46 D) 0.37

Use the substitution formula to evaluate the integral.

186) $\int_0^1 \frac{4r\,dr}{\sqrt{4+2r^2}}$ 186) _____

A) $2\sqrt{6} - 4$ B) $\sqrt{6} - 2$ C) $-2\sqrt{6} + 4$ D) $\frac{\sqrt{6}}{2} - 1$

Evaluate the integral.

187) $\int x^5\sqrt{x^6+7}\,dx$ 187) _____

A) $4(x^6+7)^{3/2} + C$ B) $\frac{2}{3}(x^6+7)^{3/2} + C$

C) $-\frac{1}{3}(x^6+7)^{-1/2} + C$ D) $\frac{1}{9}(x^6+7)^{3/2} + C$

Evaluate the integral using the given substitution.

188) $\int \left(2 - \sin\frac{t}{5}\right)^2 \cos\frac{t}{5}\,dt$, $u = 2 - \sin\frac{t}{5}$ 188) _____

A) $-\frac{5}{3}\left(2 - \sin\frac{t}{5}\right)^3 + C$ B) $\frac{1}{3}\left(2 - \sin\frac{t}{5}\right)^3 \sin\frac{t}{5} + C$

C) $5\left(2 - \sin\frac{t}{5}\right)^3 + C$ D) $\frac{5}{3}\left(2 - \cos\frac{t}{5}\right)^3 + C$

Solve the initial value problem.

189) $\frac{d^2s}{dt^2} = -36\sin\left(6t - \frac{3\pi}{2}\right)$, $s'(0) = 9$, $s(0) = -2$ 189) _____

A) $s = \sin\left(6t - \frac{3\pi}{2}\right) + 8t - 2$ B) $s = 6\cos\left(6t - \frac{3\pi}{2}\right) + 9$

C) $s = \sin\left(6t - \frac{3\pi}{2}\right) + 9t - 3$ D) $s = \sin\left(6t - \frac{3\pi}{2}\right) - 3$

Solve the problem.

190) Suppose that h is continuous and that $\int_{-3}^{2} h(x)\,dx = 3$ and $\int_{2}^{9} h(x)\,dx = -10$. Find $\int_{-3}^{9} h(t)\,dt$ and $\int_{9}^{-3} h(t)\,dt$. 190) _____

A) –13; 13 B) 7; –7 C) 13; –13 D) –7; 7

Evaluate the integral.

191) $\int_1^2 \left(t + \frac{1}{t}\right)^2 dx$ 191) _____

A) $\frac{29}{6}$ B) $\frac{37}{6}$ C) $\frac{15}{2}$ D) $\frac{5}{6}$

192) $\int_4^9 \frac{t^2+1}{\sqrt{t}}\,dt$ 192) _____

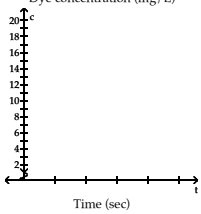
A) $\frac{447}{5}$ B) $\frac{472}{5}$ C) $\frac{432}{5}$ D) 212

Estimate the value of the quantity.

193) The table gives dye concentrations for a cardiac–output determination. The amount of dye injected was 5.8 mg. Plot the data and connect the data points with a smooth curve. Find the area under the curve using rectangles. Use this area to estimate the cardiac output. 193)

Seconds after injection	Dye Conc. (adjusted for recirculation)
0	0
2	0.2
4	0.7
6	1.9
8	4.3
10	4.1
12	2.5
14	1.2
16	0.8
18	0.2
20	0

Dye concentration (mg/L)



Time (sec)

A) 0.2 L/min B) 329.0 L/min C) 10.9 L/min D) 21.9 L/min

Evaluate the integral by using multiple substitutions.

194) $\int \frac{x\cos 6x^2\sqrt{\sin 6x^2}}{7}\,dx$ 194) _____

A) $\frac{\sin^{3/2} x^2}{21} + C$ B) $\frac{\sin^{3/2} 6x^2}{126} + C$ C) $\frac{\sqrt{\sin 6x^2}}{84} + C$ D) $\frac{\sin^{3/2} x}{126} + C$

Solve the problem.

195) Suppose that f and g are continuous and that $\int_4^8 f(x)\,dx = -3$ and $\int_4^8 g(x)\,dx = 8$. 195) _____

Find $\int_4^8 [f(x) - 2g(x)]\,dx$.

A) –11 B) –19 C) 13 D) –22

Evaluate the integral.

196) $\int_0^{\frac{1}{8}} t^2\,dt$ 196) _____

A) 1536 B) $\frac{1}{1536}$ C) $-\frac{1}{8}$ D) $-\frac{1}{1536}$

Solve the problem.

197) Suppose that $\int_2^4 f(x)\,dx = 3$. Find $\int_6^4 f(x)\,dx$ and $\int_4^2 f(x)\,dx$. 197) _____

A) 3; –3 B) 0; 3 C) 0; –3 D) 6; 3

Evaluate the integral.

198) $\int_0^{\pi/2} 12\sin x\,dx$ 198) _____

A) 0 B) –12 C) 1 D) 12

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

199) $f(x) = x^2$ between x = 0 and x = 4 using the "midpoint rule" with two rectangles of equal width. 199) _____

A) 40 B) 8 C) 38.75 D) 20

Answer each question appropriately.

200) Suppose the area of the region between the graph of a positive continuous function f and the x–axis from x = a to x = b is 13 square units. Find the area between the curves y = f(x) and y = –4f(x). 200) _____

A) 65 square units B) 39 square units C) –39 square units D) –65 square units

Find the value of the specified finite sum.

201) Given $\sum_{k=1}^{n} a_k = -3$ and $\sum_{k=1}^{n} b_k = 1$, find $\sum_{k=1}^{n} (a_k - b_k)$. 201) _____

A) 4 B) –6 C) 3 D) –4

Use a definite integral to find an expression that represents the area of the region between the given curve and the x–axis on the interval [0, b].

202) $y = \frac{x}{5} + 7$ 202) _____

A) $-\frac{b^2}{10} - 7b$ B) $-\frac{b}{5} - 7$ C) $\frac{b}{5} + 7$ D) $\frac{b^2}{10} + 7b$

Solve the initial value problem.

203) $\frac{ds}{dt} = 16t(4t^2 - 1)^3$, $s(1) = -5$ 203) _____

A) $s = \frac{1}{2}(4t^2 - 1)^4 - \frac{91}{2}$ B) $s = (4t^2 - 1)^4 - 86$

C) $s = \frac{1}{2}(4t^2 - 1)^4 - 5$ D) $s = \frac{1}{2}(4t^2 - 1)^4$

Find the derivative.

204) $\frac{d}{dx}\int_1^{\sqrt{x}} 18t^7\,dt$ 204) _____

A) $12x^5$ B) $9x^3$ C) $\frac{9}{4}x^5 - \frac{9}{4}$ D) $18x^{7/2}$

Find the area enclosed by the given curves.

205) $y = \frac{1}{2}x^2,\ y = -x^2 + 6$ 205) _____

A) 4 B) 32 C) 16 D) 8

Express the limit as a definite integral where P is a partition of the given interval.

206) $\lim_{\|P\|\to 0} \sum_{k=1}^{n} \frac{3}{10 - 11c_k^2}\Delta x_k,\ [10, 12]$ 206) _____

A) $\int_{10}^{12} \frac{3}{10 - 11x}\,dx$ B) $\int_{12}^{10} \frac{3}{10 - 11x^2}\,dx$

C) $\int_1^n \frac{3}{10 - 11x}\,dx$ D) $\int_{10}^{12} \frac{3}{10 - 11x^2}\,dx$

Solve the problem.

207) Suppose that f is continuous and that $\int_{-3}^{3} f(z)\,dz = 0$ and $\int_{-3}^{6} f(z)\,dz = 7$. Find $-\int_3^6 4f(x)\,dx$. 207) _____

A) –7 B) 28 C) –4 D) –28

Evaluate the integral.

208) $\int_0^{\pi} \theta^2\,d\theta$ 208) _____

A) $\frac{19\pi^3}{24}$ B) $\frac{27\pi^3}{24}$ C) $\frac{8\pi^3}{3}$ D) $\frac{\pi^3}{3}$

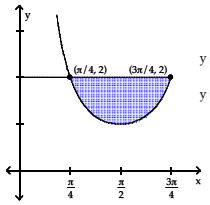
Find the derivative.

209) $\frac{d}{dt}\int_0^{\sin t} \frac{1}{4 - u^2}\,du$ 209) _____

A) $\frac{1}{4 - \sin^2 t}$ B) $\frac{1}{\cos t\,(4 - \sin^2 t)}$ C) $\frac{\cos t}{4 - \sin^2 t}$ D) $\frac{-\cos t}{4 - \sin^2 t}$

Find the area of the shaded region.

210) 210)



A) π B) π – 2 C) π + 2 D) 2

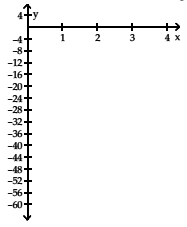
Use a finite sum to estimate the average value of the function on the given interval by partitioning the interval and evaluating the function at the midpoints of the subintervals.

211) f(x) = 2 + sin πx on [0, 2] divided into 4 subintervals 211) _____

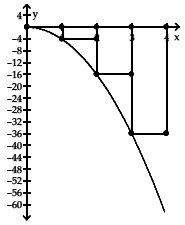
A) 0 B) 2 C) $\frac{4 + \sqrt{2}}{2}$ D) $\frac{8 + \sqrt{2}}{4}$

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

212) f(x) = $-4x^2$, [0, 4], left-hand endpoint 212)



A)



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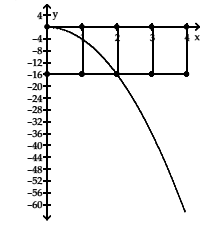
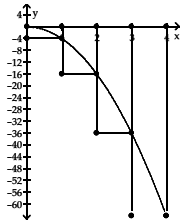
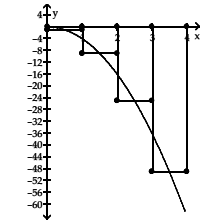


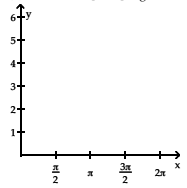
C)



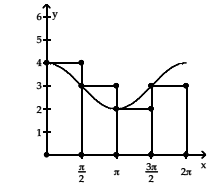
D)



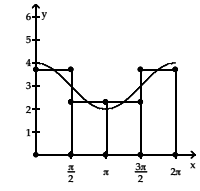
213) f(x) = cos x + 3, [0, 2π], right-hand endpoint 213)



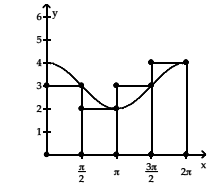
A)



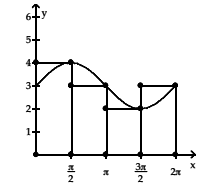
B)



C)



D)



Find the average value of the function over the given interval.

214) f(x) = 8 – | x | on [–8, 8] 214) _____

A) 2 B) 4 C) 64 D) 8

Find the total area of the region between the curve and the x–axis.

215) $y = x^2 - 6x + 9;\ 2 \le x \le 4$ 215) _____

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{7}{3}$ D) $\frac{4}{3}$

Find the derivative.

216) $\frac{d}{d\theta}\int_{\pi/4}^{\cot\theta} \csc^2 y\, dy$ 216) _____

A) $\csc^2\theta \cot\theta$ B) $-\csc^3\theta \cot\theta$

C) $-\csc^2\theta \csc^2(\cot\theta)$ D) $\csc^2(\cot\theta)$

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

217) $f(x) = x^2$ between x = 3 and x = 7 using an upper sum with four rectangles of equal width. 217) _____

A) 117 B) 105 C) 126 D) 86

Find the area enclosed by the given curves.

218) Find the area of the region in the first quadrant bounded by the line y = 8x, the line x = 1, the curve $y = \frac{1}{\sqrt{x}}$, and the x-axis. 218) _____

A) $\frac{5}{4}$ B) $\frac{3}{2}$ C) 6 D) $\frac{3}{4}$

Find the derivative.

219) $y = \int_0^x \sqrt{6x+9}\, dt$ 219) _____

A) $\sqrt{6x+9} - \sqrt{9}$ B) $\sqrt{6x+9}$ C) $\frac{1}{9}(6x+9)^{3/2}$ D) $\frac{3}{\sqrt{6x+9}}$

Solve the initial value problem.

220) $\frac{ds}{dt} = (6t+3)\sin(3t^2+3t)$, $s(0) = -5$ 220) _____

A) $s = -\cos(6t+3) - \frac{5}{2}$ B) $s = \sin(3t^2+3t) - 5$

C) $s = \cos(3t^2+3t) - 6$ D) $s = -\cos(3t^2+3t) - 4$

Evaluate the integral by using multiple substitutions.

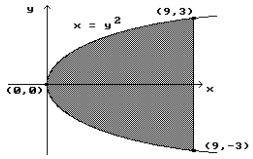
221) $\int \sqrt{3+\sin^2(x-9)}\sin(x-9)\cos(x-9)\, dx$ 221) _____

A) $\frac{3}{4}\sqrt{3+\sin^2(x-9)} + C$ B) $\frac{1}{3}(3+\sin^2(x-9))^{3/2} + C$

C) $(3+\cos^2(x-9))^{3/2} + C$ D) $\frac{1}{3}(3+\sin^2 x)^{3/2} + C$

Find the area of the shaded region.

222) 222) _____



A) 36 B) 45 C) 18 D) 27

Find the derivative.

223) $y = \int_0^x \frac{dt}{5t+5}$ 223) _____

A) $\frac{1}{5x+5}$ B) $\frac{1}{5x+5} - \frac{1}{5}$ C) $\frac{-5}{(5x+5)^2} + \frac{1}{5}$ D) $\frac{-5}{(5x+5)^2}$

Estimate the value of the quantity.

224) The velocity of a projectile fired straight into the air is given every half second. Use right endpoints to estimate the distance the projectile travelled in four seconds. 224) _____

Time (sec)	Velocity (m/sec)
0	135
0.5	130.1
1.0	125.2
1.5	120.3
2.0	115.4
2.5	110.5
3.0	105.6
3.5	100.7
4.0	95.8

A) 451.8 m B) 903.6 m C) 471.4 m D) 942.8 m

Solve the problem.

225) Given the velocity and initial position of a body moving along a coordinate line at time t, find the body's position at time t. 225) _____

$v = \cos\frac{\pi}{2}t$, $s(0) = 1$

A) $s = \frac{2}{\pi}\sin\frac{\pi}{2}t + \pi$ B) $s = \frac{2}{\pi}\sin\frac{\pi}{2}t$ C) $s = \sin t$ D) $s = 2\pi\sin\frac{\pi}{2}t$

Evaluate the integral.

226) $\int \sin(6x-5)\, dx$ 226) _____

A) $\frac{1}{6}\cos(6x-5) + C$ B) $-\cos(6x-5) + C$

C) $6\cos(6x-5) + C$ D) $-\frac{1}{6}\cos(6x-5) + C$

227) $\int_0^4 3\sqrt{x}\, dx$ 227) _____

A) 6 B) 36 C) 16 D) 24

Answer each question appropriately.

228) Suppose that $\int_0^2 f(x)\, dx = 14$. Find $\int_{-2}^0 f(x)\, dx$, if f is odd. 228) _____

A) 14 B) 28 C) −28 D) −14

Use the substitution formula to evaluate the integral.

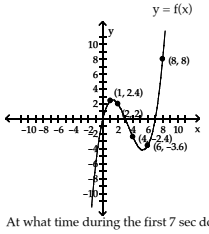
229) $\int_{\pi/3}^{2\pi} 4\cos^3 x \sin x\, dx$ 229) _____

A) $-\frac{32769}{524288}$ B) $-\frac{15}{16}$ C) $-\frac{15}{4}$ D) $\frac{15}{16}$

Solve the problem.

230) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\, dx$ feet. 230)

y = f(x)



At what time during the first 7 sec does s have its largest value?

A) 1 sec B) 3 sec C) 5 sec D) 7 sec

231) A certain company has found that its expenditure rate per day (in hundreds of dollars) on a certain type of job is given by $\frac{dE}{dx} = 2x + 7$, where x is the number of days since the start of the job. Find the expenditure if the job takes 6 days. 231) _____

A) $19 B) $78 C) $7800 D) $1900

Evaluate the integral.

232) $\int_7^{12} 11\, dx$ 232) _____

A) 55 B) −125 C) 0 D) 132

Write the sum without sigma notation and evaluate it.

233) $\sum_{k=1}^{3} 4^k \sin\frac{\pi}{6}$ 233) _____

A) $4\sin\frac{\pi}{6} + 16\sin\frac{\pi}{6} + 64\sin\frac{\pi}{6} = 42$ B) $4\sin\frac{\pi}{6} + 16\sin\frac{\pi}{6} + 64\sin\frac{\pi}{6} = 42\sqrt{3}$

C) $4\sin\frac{\pi}{6} + 64\sin\frac{\pi}{6} = 34$ D) $4 + 16 + 64 = 84$

Solve the problem.

234) Given the velocity and initial position of a body moving along a coordinate line at time t, find the body's position at time t. 234) _____

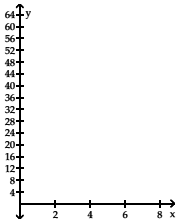
$v = \frac{8}{\pi}\sin\frac{4t}{\pi}$, $s(\pi 2) = 2$

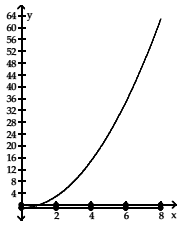
A) $s = 2\cos\frac{4t}{\pi} + 4$ B) $s = -2\cos\frac{4t}{\pi} + 8.2134$

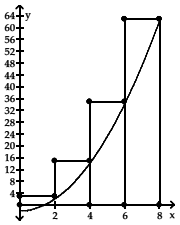
C) $s = -2\cos\frac{4t}{\pi} + 4$ D) $s = -2\cos\frac{4t}{\pi} + 3.3073$

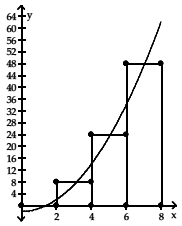
Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

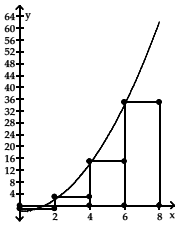
235) $f(x) = x^2 - 1$, [0, 8], left-hand endpoint 235)



A) 

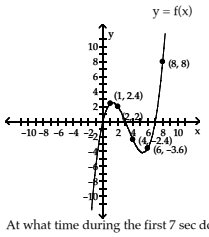
B) 

C) 

D) 

Solve the problem.

236) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\,dx$ feet. 236)



At what time during the first 7 sec does s have its largest value?

A) 5 sec B) 3 sec C) 7 sec D) 1 sec

Find the area enclosed by the given curves.

237) Find the area of the region in the first quadrant bounded on the left by the y–axis, below by the line $y = \frac{1}{3}x$, above left by $y = x + 4$, and above right by $y = -x^2 + 10$. 237) _____

A) $\frac{39}{2}$ B) 15 C) $\frac{39}{4}$ D) $\frac{73}{6}$

Find the total area of the region between the curve and the x–axis.

238) $y = x^2 + 1;\ 0 \le x \le 1$ 238) _____

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

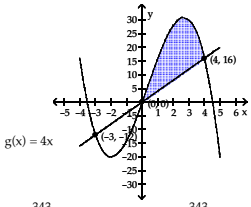
Evaluate the integral using the given substitution.

239) $\int x^4(x^5 - 6)^5\,dx,\ u = x^5 - 6$ 239) _____

A) $\frac{1}{20}(x^5 - 6)^4 + C$ B) $\frac{1}{30}(x^5 - 6)^6 + C$ C) $\frac{1}{30}x^{30} - 6 + C$ D) $\frac{1}{6}(x^5 - 6)^6 + C$

Find the area of the shaded region.

240) $f(x) = -x^3 + x^2 + 16x$ 240)



A) $\frac{343}{12}$ B) $-\frac{343}{12}$ C) $\frac{1153}{12}$ D) $\frac{937}{12}$

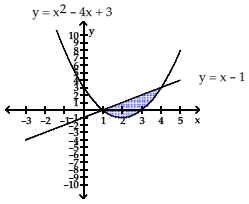
Use the substitution formula to evaluate the integral.

241) $\int_0^{\pi/2} \frac{\cos x}{(5 + 2\sin x)^3}\,dx$ 241) _____

A) $-\frac{12}{1225}$ B) $\frac{6}{1225}$ C) $-\frac{6}{25}$ D) $\frac{12}{1225}$

Find the area of the shaded region.

242) $y = x^2 - 4x + 3$ 242)



A) $\frac{19}{2}$ B) $\frac{25}{6}$ C) $\frac{41}{6}$ D) 3

Evaluate the integral using the given substitution.

243) $\int \frac{dx}{\sqrt{4x + 9}},\ u = 4x + 9$ 243) _____

A) $2\sqrt{4x + 9} + C$ B) $2\frac{1}{\sqrt{4x + 9}} + C$

C) $\frac{1}{4(4x + 9)^{3/2}} + C$ D) $\frac{1}{2}\sqrt{4x + 9} + C$

Answer each question appropriately.

244) Suppose the velocity of a body moving along the s–axis is $\frac{ds}{dt} = 9.8t - 6$. 244) _____

Is it necessary to know the initial position of the body to find the body's displacement over some time interval? Justify your answer.

A) Yes, knowing the initial position is the only way to find the exact positions at the beginning and end of the time interval. Those positions are needed to find the displacement.

B) Yes, integration is not possible without knowing the initial position.

C) No, the initial position is necessary to find the curve s= f(t) but not necessary to find the displacement. The initial position determines the integration constant. When finding the displacement the integration constant is subtracted out.

D) No, displacement has nothing to do with the position of the body.

Evaluate the integral using the given substitution.

245) $\int \sqrt{x}\cos^2(x^{3/2} - 1)\,dx,\ u = x^{3/2} - 1$ 245) _____

A) $\frac{2}{9}\sin^3(x^{3/2} - 1) + C$ B) $\frac{1}{3}(\sqrt{x})\sin(x^{3/2} - 1) + C$

C) $x^{3/2} - 1 + \frac{1}{2}\sin 2(x^{3/2} - 1) + C$ D) $\frac{1}{3}(x^{3/2} - 1) + \frac{1}{6}\sin 2(x^{3/2} - 1) + C$

Evaluate the integral by using multiple substitutions.

246) $\int \frac{(2r - 8)\cos\sqrt{3(2r - 8)^2 + 8}}{\sqrt{3(2r - 8)^2 + 8}}\,dr$ 246) _____

A) $\frac{1}{12}\sin\sqrt{3(2r - 8)^2} + C$ B) $\frac{1}{6}\sin\sqrt{3(2r - 8)^2 + 8} + C$

C) $\frac{\cos\sqrt{3r^2 + 6}}{12\sqrt{3r^2 + 6}} + C$ D) $-\sin\sqrt{3(2r - 8)^2 + 8} + C$

Estimate the value of the quantity.

247) A swimming pool has a leak. The leak is getting worse. The following table gives the leakage rate every 6 hours. 247) _____

Time (hr)	Leakage (gal/hour)
0	0
6	0.6
12	1.3
18	1.9
24	3.0
30	4.5
36	5.9
42	7.0
48	8.3

Give the upper estimate for the number of gallons lost.

A) 255 gallons B) 32.5 gallons C) 195 gallons D) 145.2 gallons

Evaluate the integral.

248) $\int_3^0 \left(3x^2 + x + 7\right)dx$ 248) _____

A) – 105 B) $\frac{105}{2}$ C) 105 D) $-\frac{105}{2}$

Use the substitution formula to evaluate the integral.

249) $\int_0^{\pi} (1 + \cos 5t)^2 \sin 5t\,dt$ 249) _____

A) $\frac{8}{3}$ B) $\frac{1}{15}$ C) $\frac{1}{5}$ D) $\frac{8}{15}$

Graph the integrand and use areas to evaluate the integral.

250) $\int_{11}^{15} x\,dx$ 250) _____

A) 52 B) 13 C) 26 D) 104

Use a finite approximation to estimate the area under the graph of the given function on the stated interval as instructed.

251) $f(x) = x^2$ between $x = 3$ and $x = 7$ using the "midpoint rule" with four rectangles of equal width. 251) _____

A) 105 B) 86 C) 126 D) 117

Find the value of the specified finite sum.

252) Given $\sum_{k=1}^{n} a_k = 4$ and $\sum_{k=1}^{n} b_k = 9$, find $\sum_{k=1}^{n} (a_k - 2b_k)$. 252) _____

A) 14 B) 22 C) −14 D) −22

Answer each question appropriately.

253) Suppose that $\int_0^3 f(x)\,dx = 10$. Find $\int_{-3}^0 f(x)\,dx$, if f is even. 253) _____

A) −30 B) 10 C) −10 D) 30

Solve the initial value problem.

254) $\frac{dy}{dx} = \sin(4x + \pi)$, $y(0) = 2$ 254) _____

A) $y = -\frac{1}{4}\cos(4x + \pi) + \frac{7}{4}$

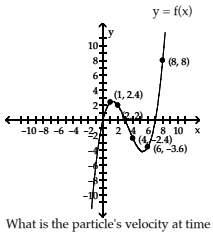
B) $y = 4\cos(4x + \pi) + 2$

C) $y = -\cos(4x + \pi) + 1$

D) $y = -\frac{1}{4}\cos(4x + \pi) + 2$

Solve the problem.

255) Suppose that f is the differentiable function shown in the graph and that the position at time t (in seconds) of a particle moving along a coordinate axis is $s = \int_0^t f(x)\,dx$ feet. 255)

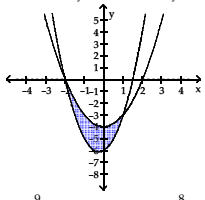


What is the particle's velocity at time t = 6?

A) −3.6 ft/sec B) 0 ft/sec C) 3.6 ft/sec D) 1.8 ft/sec

Find the area of the shaded region.

256) $y = 2x^2 + x - 6$ $y = x^2 - 4$ 256)



A) $\frac{9}{2}$ B) $\frac{8}{3}$ C) $\frac{11}{6}$ D) $\frac{19}{3}$

Write the sum without sigma notation and evaluate it.

257) $\sum_{k=1}^{3} 4^k \cos k\pi$ 257) _____

A) $4\cos\pi + 64\cos 3\pi = -68$ B) $4\cos\pi + 16\cos 2\pi + 64\cos 3\pi = 52$

C) $4\cos\pi + 16\cos 2\pi + 64\cos 3\pi = -52$ D) $4\cos\pi + 16\cos\pi + 64\cos\pi = -84$

Evaluate the integral.

258) $\int \frac{dx}{x \ln x^4}$ 258) _____

A) $\ln(\ln x^4) + C$ B) $\frac{1}{4}\ln(\ln x^4) + C$ C) $\frac{1}{4}\ln x^4 + C$ D) $\ln x^4 + C$

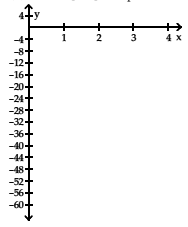
259) $\int \csc\left(z + \frac{\pi}{3}\right)\cot\left(z + \frac{\pi}{3}\right) dz$ 259) _____

A) $-\cot\left(z + \frac{\pi}{3}\right) + C$ B) $-\csc\left(z + \frac{\pi}{3}\right) + C$

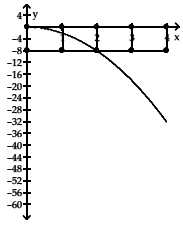
C) $\csc\left(z + \frac{\pi}{3}\right) + C$ D) $-\frac{\pi}{3}\csc\left(z + \frac{\pi}{3}\right) + C$

Graph the function f(x) over the given interval. Partition the interval into 4 subintervals of equal length. Then add to your sketch the rectangles associated with the Riemann sum $\sum_{k=1}^{4} f(c_k)\,\Delta x_k$, using the indicated point in the kth subinterval for c_k.

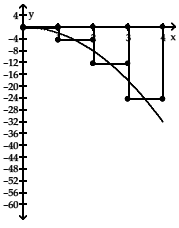
260) $f(x) = -2x^2$, [0, 4], midpoint 260)



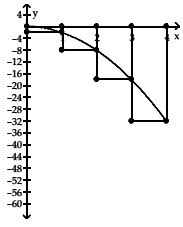
A)



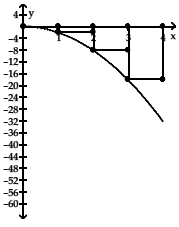
B)



C)



D)



Express the limit as a definite integral where P is a partition of the given interval.

261) $\lim_{\|P\| \to 0} \sum_{k=1}^{n} (\sin c_k)\,\Delta x_k$, $[-\pi/4, 0]$ 261) _____

A) $\int_1^n \sin x\,dx$ B) $\int_{-\pi/4}^0 \sin x\,dx$ C) $\int_0^{\pi/4} \sin x\,dx$ D) $\int_{-\pi/4}^0 \cos x\,dx$

Find the area enclosed by the given curves.

262) $y = 2x - x^2$, $y = 2x - 4$ 262) _____

A) $\frac{34}{3}$ B) $\frac{32}{3}$ C) $\frac{31}{3}$ D) $\frac{37}{3}$

263) Find the area of the region in the first quadrant bounded on the left by the line $y = \frac{\pi}{6}$ and on the right by the curves $y = \tan^2 x$ and $y = \cot^2 x$. (Round to four decimal places.) 263) _____

A) 0.4126 B) 4.3094 C) 0.5858 D) 0.3094

Solve the initial value problem.

264) $\frac{dy}{dx} = x\cos(6x^2)$, $y(0) = 8$ 264) _____

A) $y = \frac{x^2}{2}\sin(6x^2) + 8$

B) $y = \frac{1}{12}\sin(6x^2) + 8$

C) $y = \sin(6x^2) + 8$

D) $y = \frac{1}{u}\sin(u)$

1) D
ID: TCALC11W 5.6.4–5
Diff: 0 Page Ref: 378–385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

2) a = –2 and b = 2
ID: TCALC11W 5.3.7–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

3) If $f(x) = \sqrt{1 + x^4}$ on [0, 1], then max f = $\sqrt{2}$ and min f = 1.
So min f • (1 – 0) ≤ $\int_0^1 \sqrt{1 + x^4}\,dx$ ≤ max f • (1 – 0) or $1 \le \int_0^1 \sqrt{1 + x^4}\,dx \le \sqrt{2} \le 2$.
ID: TCALC11W 5.3.7–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

4) Since the plane averaged 300 mph on the first 600 miles, the first part of the trip took 600/300 = 2 hours. The return trip took 600/400 = 1.5 hours. The entire trip of 1200 miles took 3.5 hours. So the average speed was 1200/3.5 = 343 mph.
ID: TCALC11W 5.3.7–9
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

5) If $f(x) = \frac{1}{x}$ on [1, 2], then max f = 1 and min f = $\frac{1}{2}$.
So min f • (2 – 1) ≤ $\int_1^2 \frac{1}{x}\,dx$ ≤ max f • (2 – 1) or $\frac{1}{2} \le \int_1^2 \frac{1}{x}\,dx \le 1$.
If $f(x) = \frac{1}{x}$ on [2, 3], then max f = $\frac{1}{2}$ and min f = $\frac{1}{3}$.
So min f • (3 – 2) ≤ $\int_2^3 \frac{1}{x}\,dx$ ≤ max f • (3 – 2) or $\frac{1}{3} \le \int_2^3 \frac{1}{x}\,dx \le \frac{1}{2}$.
So $\frac{1}{2} + \frac{1}{3} \le \int_1^3 \frac{1}{x}\,dx \le 1 + \frac{1}{2}$ or $\frac{5}{6} \le \int_1^3 \frac{1}{x}\,dx \le \frac{3}{2}$.
ID: TCALC11W 5.3.7–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

6) $\int_a^b dx = \int_a^b 1\,dx = x\Big|_a^b = b - a$. The integral represents the area of the rectangle under y = 1 from x = a to x = b, which equals 1(b–a) = b – a.
ID: TCALC11W 5.3.7–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

7) If $f(x) = \frac{1}{x}$ on [1, 3], then max f = 1 and min f = $\frac{1}{3}$.
So min f • (3 – 1) ≤ $\int_1^3 \frac{1}{x}\,dx$ ≤ max f • (3 – 1) and $\frac{1}{3} \cdot (3 - 1) \le \int_1^3 \frac{1}{x}\,dx \le 1 \cdot (3 - 1)$ and $\frac{2}{3} \le \int_1^3 \frac{1}{x}\,dx \le 2$. So the lower bound is $\frac{2}{3}$, and the upper bound is 2.
ID: TCALC11W 5.3.7–6
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

8) $A = nr^2 \tan\left(\frac{\pi}{n}\right)$
ID: TCALC11W 5.3.7–10
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

9) If f(x) ≤ 0 on [a, b], then max f ≤ 0. So $\int_a^b f(x)\,dx \le \max f \cdot (b - a) \le 0$.
ID: TCALC11W 5.3.7–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

10) a = 0 and b = 2
ID: TCALC11W 5.3.7–2
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

11) If u = cot x and du = – $\csc^2 x\,dx$, then $\int \csc^2 x \cot x\,dx = \int -u\,du = -\frac{u^2}{2} + C = -\frac{\cot^2 x}{2} + C$. If u = csc x and du = – csc x cot x, then $\int \csc^2 x \cot x\,dx = \int -u\,du = -\frac{u^2}{2} + C = -\frac{\csc^2 x}{2} + C = -\frac{1 + \cot^2 x}{2} + C$
$= -\frac{1}{2} - \frac{\cot^2 x}{2} + C = -\frac{\cot^2 x}{2} + C_1$.
ID: TCALC11W 5.3.7–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) ∗Theory and Examples: Integration and Sums

12) B
ID: TCALC11W 5.4.8–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

13) C
ID: TCALC11W 5.2.1–1
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

14) A
ID: TCALC11W 5.5.1–3
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

15) A
ID: TCALC11W 5.2.1–6
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

16) A
ID: TCALC11W 5.4.1–7
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

17) D
ID: TCALC11W 5.2.2–1
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Value Using Algebraic Rules

18) B
ID: TCALC11W 5.4.5–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

19) D
ID: TCALC11W 5.1.2–10
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

20) D
ID: TCALC11W 5.5.1–5
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

21) D
ID: TCALC11W 5.5.3–2
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

22) D
ID: TCALC11W 5.4.6–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Apps: Fundamental Theorem of Calculus

23) D
ID: TCALC11W 5.1.2–6
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

24) C
ID: TCALC11W 5.6.3–5
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

25) A
ID: TCALC11W 5.5.4–5
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

26) C
ID: TCALC11W 5.3.3–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

27) C
ID: TCALC11W 5.1.2–5
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

28) B
ID: TCALC11W 5.5.4–7
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

29) C
ID: TCALC11W 5.5.4–4
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

30) A
ID: TCALC11W 5.1.3–7
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

31) A
ID: TCALC11W 5.5.2–1
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

32) D
ID: TCALC11W 5.2.3–10
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

33) B
ID: TCALC11W 5.4.5–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

34) C
ID: TCALC11W 5.4.1–8
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

35) D
ID: TCALC11W 5.3.4–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

36) A
ID: TCALC11W 5.3.3–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

37) B
ID: TCALC11W 5.3.6–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

38) D
ID: TCALC11W 5.6.1–4
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

39) C
ID: TCALC11W 5.4.2–10
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

40) B
ID: TCALC11W 5.4.3–8
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

41) C
ID: TCALC11W 5.5.3–5
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

42) D
ID: TCALC11W 5.2.2–3
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Value Using Algebraic Rules

43) C
ID: TCALC11W 5.3.1–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

44) C
ID: TCALC11W 5.4.4–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

45) B
ID: TCALC11W 5.4.8–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

46) D
ID: TCALC11W 5.6.1–8
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

47) B
ID: TCALC11W 5.5.5–4
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Velocity/Acceleration Problem

48) A
ID: TCALC11W 5.5.3–8
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

49) C
ID: TCALC11W 5.6.2–10
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

50) D
ID: TCALC11W 5.3.2–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

51) B
ID: TCALC11W 5.3.2–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

52) A
ID: TCALC11W 5.3.1–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

53) D
ID: TCALC11W 5.4.4–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

54) B
ID: TCALC11W 5.4.8–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

55) D
ID: TCALC11W 5.3.3–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

56) B
ID: TCALC11W 5.4.5–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

57) D
ID: TCALC11W 5.6.2–8
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

58) A
ID: TCALC11W 5.4.7–7
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

59) B
ID: TCALC11W 5.1.1–4
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

60) B
ID: TCALC11W 5.6.2–4
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

61) A
ID: TCALC11W 5.4.7–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

62) B
ID: TCALC11W 5.2.3–8
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

63) A
ID: TCALC11W 5.1.2–8
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

64) B
ID: TCALC11W 5.1.1–10
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

65) A
ID: TCALC11W 5.2.3–2
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

66) B
ID: TCALC11W 5.3.5–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Area Between Curve and x–Axis

67) A
ID: TCALC11W 5.1.3–5
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

68) B
ID: TCALC11W 5.3.3–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

69) B
ID: TCALC11W 5.2.4–1
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Area Taking Limit of Upper Sum

70) B
ID: TCALC11W 5.1.3–1
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

71) A
ID: TCALC11W 5.6.1–2
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

72) A
ID: TCALC11W 5.1.1–2
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

73) A
ID: TCALC11W 5.4.2–7
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

74) C
ID: TCALC11W 5.3.6–6
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

75) D
ID: TCALC11W 5.3.6–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

76) D
ID: TCALC11W 5.3.6–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

77) D
ID: TCALC11W 5.3.3–9
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

78) A
ID: TCALC11W 5.4.8–8
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

79) A
ID: TCALC11W 5.3.1–9
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

80) B
ID: TCALC11W 5.3.4–9
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

81) D
ID: TCALC11W 5.5.1-6
Diff: 0 Page Ref: 370-376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

82) C
ID: TCALC11W 5.3.1-10
Diff: 0 Page Ref: 345-354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

83) C
ID: TCALC11W 5.4.3-1
Diff: 0 Page Ref: 358-366
Objective: (5.4) Find Area Between Curve and x-Axis

84) C
ID: TCALC11W 5.1.1-5
Diff: 0 Page Ref: 327-335
Objective: (5.1) Approximate Area Using Finite Sum

85) B
ID: TCALC11W 5.5.2-2
Diff: 0 Page Ref: 370-376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

86) A
ID: TCALC11W 5.6.4-3
Diff: 0 Page Ref: 378-385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

87) C
ID: TCALC11W 5.5.5-5
Diff: 0 Page Ref: 370-376
Objective: (5.5) Solve Velocity/Acceleration Problem

88) D
ID: TCALC11W 5.4.3-9
Diff: 0 Page Ref: 358-366
Objective: (5.4) Find Area Between Curve and x-Axis

89) D
ID: TCALC11W 5.4.7-8
Diff: 0 Page Ref: 358-366
Objective: (5.4) Draw Conclusion about Motion from Graph

90) A
ID: TCALC11W 5.4.1-10
Diff: 0 Page Ref: 358-366
Objective: (5.4) Evaluate Integral

91) C
ID: TCALC11W 5.3.4-4
Diff: 0 Page Ref: 345-354
Objective: (5.3) Evaluate Definite Integral

92) A
ID: TCALC11W 5.2.4-3
Diff: 0 Page Ref: 337-344
Objective: (5.2) Find Area Taking Limit of Upper Sum

93) D
ID: TCALC11W 5.1.1-6
Diff: 0 Page Ref: 327-335
Objective: (5.1) Approximate Area Using Finite Sum

94) B
ID: TCALC11W 5.6.1-1
Diff: 0 Page Ref: 378-385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

95) D
ID: TCALC11W 5.4.1-9
Diff: 0 Page Ref: 358-366
Objective: (5.4) Evaluate Integral

96) A
ID: TCALC11W 5.3.6-2
Diff: 0 Page Ref: 345-354
Objective: (5.3) Find Average Value by Geometric Method

97) A
ID: TCALC11W 5.6.4-2
Diff: 0 Page Ref: 378-385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

98) C
ID: TCALC11W 5.6.1-9
Diff: 0 Page Ref: 378-385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

99) C
ID: TCALC11W 5.5.1-1
Diff: 0 Page Ref: 370-376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

100) C
ID: TCALC11W 5.5.5-1
Diff: 0 Page Ref: 370-376
Objective: (5.5) Solve Velocity/Acceleration Problem

101) C
ID: TCALC11W 5.4.7-5
Diff: 0 Page Ref: 358-366
Objective: (5.4) Draw Conclusion about Motion from Graph

102) A
ID: TCALC11W 5.3.2-9
Diff: 0 Page Ref: 345-354
Objective: (5.3) Use Properties/Known Values to Find Integral

103) B
ID: TCALC11W 5.2.4-2
Diff: 0 Page Ref: 337-344
Objective: (5.2) Find Area Taking Limit of Upper Sum

104) A
ID: TCALC11W 5.1.2-2
Diff: 0 Page Ref: 327-335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

105) D
ID: TCALC11W 5.2.1-8
Diff: 0 Page Ref: 337-344
Objective: (5.2) Write Sum and Evaluate

106) C
ID: TCALC11W 5.4.1-3
Diff: 0 Page Ref: 358-366
Objective: (5.4) Evaluate Integral

107) C
ID: TCALC11W 5.6.2-9
Diff: 0 Page Ref: 378-385
Objective: (5.6) Find Area of Shaded Region

108) D
ID: TCALC11W 5.1.3-3
Diff: 0 Page Ref: 327-335
Objective: (5.1) Estimate Average Value of Function

109) D
ID: TCALC11W 5.4.4-8
Diff: 0 Page Ref: 358-366
Objective: (5.4) Find Area of Shaded Region on Graph

110) D
ID: TCALC11W 5.4.3-4
Diff: 0 Page Ref: 358-366
Objective: (5.4) Find Area Between Curve and x-Axis

111) A
ID: TCALC11W 5.3.2-2
Diff: 0 Page Ref: 345-354
Objective: (5.3) Use Properties/Known Values to Find Integral

112) C
ID: TCALC11W 5.3.3-6
Diff: 0 Page Ref: 345-354
Objective: (5.3) Use Area to Evaluate Integral

113) D
ID: TCALC11W 5.5.3-7
Diff: 0 Page Ref: 370-376
Objective: (5.5) Integrate by Using Sequences of Substitutions

114) B
ID: TCALC11W 5.4.1-2
Diff: 0 Page Ref: 358-366
Objective: (5.4) Evaluate Integral

115) D
ID: TCALC11W 5.4.3-7
Diff: 0 Page Ref: 358-366
Objective: (5.4) Find Area Between Curve and x-Axis

116) A
ID: TCALC11W 5.3.3-10
Diff: 0 Page Ref: 345-354
Objective: (5.3) Use Area to Evaluate Integral

117) B
ID: TCALC11W 5.5.2-10
Diff: 0 Page Ref: 370-376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

118) C
ID: TCALC11W 5.1.3-8
Diff: 0 Page Ref: 327-335
Objective: (5.1) Estimate Average Value of Function

119) C
ID: TCALC11W 5.3.1-6
Diff: 0 Page Ref: 345-354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

120) C
ID: TCALC11W 5.3.1-3
Diff: 0 Page Ref: 345-354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

121) A
ID: TCALC11W 5.5.2-5
Diff: 0 Page Ref: 370-376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

122) C
ID: TCALC11W 5.4.8-6
Diff: 0 Page Ref: 358-366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

123) D
ID: TCALC11W 5.3.4-1
Diff: 0 Page Ref: 345-354
Objective: (5.3) Evaluate Definite Integral

124) B
ID: TCALC11W 5.1.3-2
Diff: 0 Page Ref: 327-335
Objective: (5.1) Estimate Average Value of Function

125) A
ID: TCALC11W 5.3.1–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

126) B
ID: TCALC11W 5.4.3–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

127) A
ID: TCALC11W 5.1.3–9
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

128) C
ID: TCALC11W 5.5.2–7
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

129) B
ID: TCALC11W 5.4.4–9
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

130) C
ID: TCALC11W 5.6.3–6
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

131) A
ID: TCALC11W 5.2.1–3
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

132) D
ID: TCALC11W 5.3.4–2
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

133) A
ID: TCALC11W 5.4.2–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

134) B
ID: TCALC11W 5.4.8–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

135) D
ID: TCALC11W 5.3.5–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Area Between Curve and x–Axis

136) A
ID: TCALC11W 5.3.3–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

137) C
ID: TCALC11W 5.4.5–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

138) A
ID: TCALC11W 5.6.2–7
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

139) C
ID: TCALC11W 5.3.4–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

140) B
ID: TCALC11W 5.2.1–2
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

141) B
ID: TCALC11W 5.2.3–5
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

142) A
ID: TCALC11W 5.5.4–3
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

143) A
ID: TCALC11W 5.4.4–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

144) C
ID: TCALC11W 5.6.3–3
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

145) D
ID: TCALC11W 5.3.3–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

146) D
ID: TCALC11W 5.2.1–5
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

147) B
ID: TCALC11W 5.1.1–1
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

148) D
ID: TCALC11W 5.3.5–2
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Area Between Curve and x–Axis

149) D
ID: TCALC11W 5.3.6–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

150) B
ID: TCALC11W 5.3.1–2
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

151) A
ID: TCALC11W 5.4.4–7
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

152) D
ID: TCALC11W 5.3.2–8
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

153) A
ID: TCALC11W 5.4.3–10
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

154) C
ID: TCALC11W 5.4.8–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

155) B
ID: TCALC11W 5.4.3–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

156) A
ID: TCALC11W 5.1.2–3
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

157) B
ID: TCALC11W 5.6.1–5
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

158) A
ID: TCALC11W 5.2.2–4
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Value Using Algebraic Rules

159) C
ID: TCALC11W 5.4.7–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

160) B
ID: TCALC11W 5.5.1–8
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

161) D
ID: TCALC11W 5.3.6–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

162) C
ID: TCALC11W 5.1.2–4
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

163) B
ID: TCALC11W 5.2.3–1
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

164) D
ID: TCALC11W 5.5.1–9
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

165) B
ID: TCALC11W 5.5.2–9
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

166) B
ID: TCALC11W 5.4.4–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

167) A
ID: TCALC11W 5.4.6–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Apps: Fundamental Theorem of Calculus

168) D
ID: TCALC11W 5.6.3–2
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

169) C
ID: TCALC11W 5.4.4–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

170) D
ID: TCALC11W 5.6.2–6
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

171) D
ID: TCALC11W 5.4.2–8
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

172) D
ID: TCALC11W 5.2.1–4
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

173) D
ID: TCALC11W 5.2.1–7
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

174) C
ID: TCALC11W 5.4.2–9
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

175) D
ID: TCALC11W 5.3.2–6
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

176) B
ID: TCALC11W 5.4.7–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

177) B
ID: TCALC11W 5.4.5–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

178) D
ID: TCALC11W 5.2.3–3
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

179) B
ID: TCALC11W 5.1.3–4
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

180) D
ID: TCALC11W 5.3.6–9
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

181) A
ID: TCALC11W 5.5.3–4
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

182) A
ID: TCALC11W 5.1.1–7
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

183) C
ID: TCALC11W 5.6.2–1
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

184) B
ID: TCALC11W 5.6.3–7
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

185) D
ID: TCALC11W 5.1.3–10
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

186) A
ID: TCALC11W 5.6.1–3
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

187) D
ID: TCALC11W 5.5.2–3
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

188) A
ID: TCALC11W 5.5.1–2
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

189) C
ID: TCALC11W 5.5.4–8
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

190) D
ID: TCALC11W 5.3.2–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

191) A
ID: TCALC11W 5.4.1–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

192) C
ID: TCALC11W 5.4.1–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

193) C
ID: TCALC11W 5.1.2–1
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

194) B
ID: TCALC11W 5.5.3–3
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

195) B
ID: TCALC11W 5.3.2–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

196) B
ID: TCALC11W 5.3.4–3
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

197) C
ID: TCALC11W 5.3.2–1
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

198) D
ID: TCALC11W 5.4.1–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

199) D
ID: TCALC11W 5.1.1–3
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

200) A
ID: TCALC11W 5.6.4–4
Diff: 0 Page Ref: 378–385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

201) D
ID: TCALC11W 5.2.2–2
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Value Using Algebraic Rules

202) D
ID: TCALC11W 5.3.5–4
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Area Between Curve and x–Axis

203) A
ID: TCALC11W 5.5.4–2
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

204) B
ID: TCALC11W 5.4.2–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

205) C
ID: TCALC11W 5.6.3–4
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

206) D
ID: TCALC11W 5.3.1–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

207) D
ID: TCALC11W 5.3.2–10
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Properties/Known Values to Find Integral

208) D
ID: TCALC11W 5.3.4–5
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

209) C
ID: TCALC11W 5.4.2–3
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

210) B
ID: TCALC11W 5.4.4–10
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

211) C
ID: TCALC11W 5.1.3–6
Diff: 0 Page Ref: 327–335
Objective: (5.1) Estimate Average Value of Function

212) A
ID: TCALC11W 5.2.3–7
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

213) C
ID: TCALC11W 5.2.3–9
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

214) B
ID: TCALC11W 5.3.6–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) Find Average Value by Geometric Method

215) B
ID: TCALC11W 5.4.3–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

216) C
ID: TCALC11W 5.4.2–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

217) C
ID: TCALC11W 5.1.1–8
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

218) A
ID: TCALC11W 5.6.3–8
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

219) B
ID: TCALC11W 5.4.2–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

220) D
ID: TCALC11W 5.5.4–6
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem

221) B
ID: TCALC11W 5.5.3–6
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

222) A
ID: TCALC11W 5.4.4–5
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area of Shaded Region on Graph

223) A
ID: TCALC11W 5.4.2–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Differentiate Integral

224) A
ID: TCALC11W 5.1.2–7
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

225) B
ID: TCALC11W 5.5.5–2
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Velocity/Acceleration Problem

226) D
ID: TCALC11W 5.5.2–6
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

227) C
ID: TCALC11W 5.4.1–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Evaluate Integral

228) D
ID: TCALC11W 5.6.4–6
Diff: 0 Page Ref: 378–385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

229) B
ID: TCALC11W 5.6.1–6
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

230) B
ID: TCALC11W 5.4.7–2
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

231) C
ID: TCALC11W 5.4.6–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Apps: Fundamental Theorem of Calculus

232) A
ID: TCALC11W 5.3.4–6
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

233) A
ID: TCALC11W 5.2.1–9
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

234) C
ID: TCALC11W 5.5.5–3
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Velocity/Acceleration Problem

235) D
ID: TCALC11W 5.2.3–4
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

236) B
ID: TCALC11W 5.4.8–7
Diff: 0 Page Ref: 358–366
Objective: (5.4) Know Concepts: Fundamental Theorem of Calculus

237) D
ID: TCALC11W 5.6.3–10
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

238) C
ID: TCALC11W 5.4.3–6
Diff: 0 Page Ref: 358–366
Objective: (5.4) Find Area Between Curve and x–Axis

239) B
ID: TCALC11W 5.5.1–4
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

240) D
ID: TCALC11W 5.6.2–2
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

241) B
ID: TCALC11W 5.6.1–10
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

242) A
ID: TCALC11W 5.6.2–3
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

243) D
ID: TCALC11W 5.5.1–10
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

244) C
ID: TCALC11W 5.6.4–1
Diff: 0 Page Ref: 378–385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

245) D
ID: TCALC11W 5.5.1–7
Diff: 0 Page Ref: 370–376
Objective: (5.5) Evaluate Integral Using Suggested Substitution

246) B
ID: TCALC11W 5.5.3–1
Diff: 0 Page Ref: 370–376
Objective: (5.5) Integrate by Using Sequences of Substitutions

247) C
ID: TCALC11W 5.1.2–9
Diff: 0 Page Ref: 327–335
Objective: (5.1) Solve Apps: Velocity, Distance, Flow

248) D
ID: TCALC11W 5.3.4–10
Diff: 0 Page Ref: 345–354
Objective: (5.3) Evaluate Definite Integral

249) D
ID: TCALC11W 5.6.1–7
Diff: 0 Page Ref: 378–385
Objective: (5.6) Use Substitution Formula to Evaluate Integral

250) A
ID: TCALC11W 5.3.3–2
Diff: 0 Page Ref: 345–354
Objective: (5.3) Use Area to Evaluate Integral

251) A
ID: TCALC11W 5.1.1–9
Diff: 0 Page Ref: 327–335
Objective: (5.1) Approximate Area Using Finite Sum

252) C
ID: TCALC11W 5.2.2–5
Diff: 0 Page Ref: 337–344
Objective: (5.2) Find Value Using Algebraic Rules

253) B
ID: TCALC11W 5.6.4–7
Diff: 0 Page Ref: 378–385
Objective: (5.6) Know Concepts: Substitution and Area Between Curves

254) A
ID: TCALC11W 5.4.5–4
Diff: 0 Page Ref: 358–366
Objective: (5.4) Solve Initial Value Problem

255) A
ID: TCALC11W 5.4.7–1
Diff: 0 Page Ref: 358–366
Objective: (5.4) Draw Conclusion about Motion from Graph

256) D
ID: TCALC11W 5.6.2–5
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area of Shaded Region

257) C
ID: TCALC11W 5.2.1–10
Diff: 0 Page Ref: 337–344
Objective: (5.2) Write Sum and Evaluate

258) B
ID: TCALC11W 5.5.2–4
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

259) B
ID: TCALC11W 5.5.2–8
Diff: 0 Page Ref: 370–376
Objective: (5.5) Use Substitution Rule to Evaluate Integral

260) B
ID: TCALC11W 5.2.3–6
Diff: 0 Page Ref: 337–344
Objective: (5.2) Construct Rectangles for Riemann Sum

261) B
ID: TCALC11W 5.3.1–7
Diff: 0 Page Ref: 345–354
Objective: (5.3) Express Limit of Riemann Sums as Definite Integral

262) B
ID: TCALC11W 5.6.3–1
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

263) D
ID: TCALC11W 5.6.3–9
Diff: 0 Page Ref: 378–385
Objective: (5.6) Find Area Enclosed by Curves Given Equations

264) B
ID: TCALC11W 5.5.4–1
Diff: 0 Page Ref: 370–376
Objective: (5.5) Solve Initial Value Problem