ÇANKAYA UNIVERSITY

Department of Mathematics and Computer Science

MATH 155 Calculus for Engineering I

Practice Final (B)

January 16, 2007

09:00-11:00

Question 1.

(a) If $xy = 10$, then find the largest possible value of $x + y$.
(b) If $x + y = 10$, then find the largest possible value of xy.

Answer 1.

Question 2.

(a) Consider the function $h(x) = (1 + \sin \pi x)^{g(x)}$. Suppose $g(1) = 2$ and $g'(1) = -1$. Find $h'(1)$.

(b) Find the point on the curve $y = e^{-x^2}$ where the slope of the tangent line is $2/e$. Find $h'(1)$.

(c) Find the x-intercept c of the tangent line to the curve in part (b)..

Answer 2.

Question 3. Evaluate.

(a) $\lim_{x\to\infty}\left(1+\frac{1}{3x}\right)^{7+2x}$.

(b) $\lim_{x\to 2}(11-5x)^{\frac{1}{3x-6}}$.

Answer 3.

Question 4. Evaluate.

$$\int_0^{\pi/4} \left(e^{-2x} + \sin 3x\right)^2 \, dx.$$

Answer 4.

Question 5. Evaluate.

(a) $\displaystyle\int \frac{x^2 dx}{(x^2-4)^{5/2}}$.

(b) $\displaystyle\int \tan^3\left(\frac{x}{2}\right)\sec^4\left(\frac{x}{2}\right)\, dx$.

Answer 5.

Question 6. Evaluate.

(a) $\int x^3 \ln x \, dx.$

(b) $\int \dfrac{12x^2 + 7x + 1}{(x^2 + 1)(x + 1)^2} \, dx.$

Answer 6.

Question 7.

(a) Does $\displaystyle\int_0^\infty \frac{dx}{\sqrt{x+x^4}}\,dx$ converge or diverge. Prove your answer.

(b) Determine whether $\displaystyle\int_2^\infty \frac{x^2+x+2}{x^4+x^2-1}\,dx$ converges or diverges. Give reasons for your answer.

Answer 7.

Question 8. Find the area under the curve $f(x) = \dfrac{1}{e^x + e^{-x}}$ from $x = 1$ to $x = 2$.

Answer 8.