MA119-A Applied Calculus for Business

2006 Fall

Practice Test of Midterm 2

(Only 10 Problems will be graded. You can choose any 10 Problems.)

1. Find an equation of the tangent line to the graph of the function

   \[ f(x) = \frac{8}{\sqrt{x^2 + 6x}} \]

   at the given point (2, 2).

2. Acceleration of a Car

   The distance \( s \) (in feet) covered by a car after \( t \) sec given by

   \[ s(t) = 2xe^{3x} \quad (t \geq 0). \]

   Find a general expression for the car’s acceleration at any time \( t \) \((t \geq 0)\). Show that the car is always accelerating.

3. Find the derivative \( \frac{dy}{dx} \) of

   \[ (x + y^2)^{10} = x^2 + 25 \]

   by implicit differentiation.

4. Find the interval(s) where the function

   \[ f(x) = \frac{x^2}{x - 1} \]

   is increasing and the interval(s) where it is decreasing.
5. Find the relative maxima and relative minima, if any, of the function

\[ g(x) = \frac{x}{x^2 - 1}. \]

6. Find the inflection point(s), if any, of the function

\[ f(x) = x^4 - 2x^3 + 6. \]

7. Find the relative extrema, if any, of the function

\[ f(x) = \frac{2x}{x^2 + 1}. \]

Use the second derivative test, if applicable.

8. Find the absolute maximum value and the absolute minimum value, if any, of the function

\[ g(x) = 3x^4 + 4x^3 \]

on \([-2, 1]\).

9. Solve the equation

\[ 8^x = \left( \frac{1}{32} \right)^{x-2} \]

for \(x\).

10. Use logarithms to solve the equation \( \frac{50}{1 + 4e^{0.2t}} = 20 \) for \(t\).

11. Find the interest rate needed for an investment of $5000 to grow to an amount of $8000 in 4 yr if interest is compounded semiannually.

12. Find the derivative \( \frac{dy}{dx} \) of the function

\[ y = \frac{(2x^2 - 1)^5}{\sqrt{x + 1}}. \]