PRINCE SULTAN UNIVERSITY
Department of Mathematical Sciences
MATH 211 – Business Calculus
Second Examination
December 2005

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Time Allowed: One and a half Hours

NAME ID

Q1. Use implicit differentiation to find $\frac{dy}{dx}$, where $x^3 + xy + y^3 = x$.

Q2. The revenue of selling "Al-Yamamah Weekly" magazine is given by

$$R(p) = p^3 - 5p^2 + 21p + 50, \qquad 2 \le p \le 8$$

where p is the price of the magazine.
Find the price that maximizes the revenue, and find that revenue. Show all work.

Q3. Find an equation for the tangent line to the curve $x^3 + xy + y^3 = x$ at the point (1, 0).

Q4. If the total cost of manufacturing q units of a certain commodity is

$$C(q) = (3q + 1)(5q + 7),$$

use **marginal analysis** to estimate the cost of producing the 19th unit, in dollars.

Q5. The demand equation for math tutors is given by

$$x^2 y - 1550 = 10x,$$

where y is the demand and x is the price. Find $\frac{dy}{dx}$ when x = 5.

Q6. How much money should be invested today at an annual interest rate of 4% compounded continuously so that 40 years from now it will be worth $26000?

Q.7. Find the derivative of the functions

a) $y = x^2 e^{2x}$

b) $y = \ln\left(\frac{x^2\sqrt{3x-1}}{x-1}\right)$

Q8. Compute the elasticity of demand for the demand function $D(p) = -1.3p + 10$ and determine whether the demand is elastic, inelastic, or unit elasticity at the price $p = 4$.

Q9. Find all extrema and points of inflection and **sketch** the graph of the function

$$g(x) = 2x^3 + 3x^2 - 12x + 1$$

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