

PRINCE SULTAN UNIVERSITY

MATH 211

BUSINESS CALCULUS

MAJOR EXAM 2

6th JANUARY 2010

Start: 4:00 p.m.

End: 5:30 p.m.

Name: _____

I.D. _____

Instructors Name: _____

Section: _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 5 Question Sheets with 11 questions.
3. You can use a calculator, **NOT** a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1,2,3	19	
4,5,6	26	
7,8	14	
9	9	
10,11	12	
TOTAL POINTS	80	
TOTAL	20	

- 1) [6 points] Find the equation of the tangent line to $1 - 2xy = 6x + y$ at the point $(0, -1)$.
- 2) [6 points] When the price of a certain commodity is p dollars per unit, customers demand q hundred units of the commodity, where $3q + 30p^2 = 250$. How fast is the demand q changing **with respect to time** when the price is \$3 and it is **decreasing** at the rate of \$0.5 per month?
- 3) [7 points] The total cost of producing x units of a certain commodity is $C(x)$ thousand dollars, where $C(x) = 4x^4 - 72x^3 + 324x^2$
- a) Find $A(x) = \frac{C(x)}{x}$, the average cost function.
- b) Find $A'(x)$.
- c) For what values of x is A increasing and decreasing?
- d) For what level of production is average cost minimized? Where is it maximized?

- 4) [12 points] Determine where the function $f(x) = (x^2 - 3)^2$ is increasing and decreasing, where it is concave up and concave down. Find the relative extrema and the inflection points. Sketch the graph.
- 5) [4 points] Find the absolute maximum and absolute minimum (if any) of $f(x) = x^5 - 5x^4 + 1$ on the interval $0 \leq x \leq 5$.
- 6) [10 points] Given that $p(q) = 180 - 2q$ and $C(q) = q^3 + 5q + 162$, find the revenue function R , the profit function P , the marginal revenue, the marginal cost and determine the production q where P is maximized.

7) [8 points] A store determines when the price is p hundred dollars per set, q sets will be sold each month, where $q = 200 - 2p^2$ (for $0 \leq p \leq 10$)

a) Find the elasticity of demand for the product.

b) For a unit price of \$600 ($p = 6$) is the demand elastic, inelastic or unitary?

c) At what price is the elasticity of demand equal to -1 ?

8) [6 points] Differentiate the following functions:

a) $f(x) = e^{x^2+2x-1}$

b) $f(x) = \frac{(x+2)^5}{\sqrt[3]{3x-5}}$ (Hint: Use Logarithmic Differentiation)

9) [9 points} Find the following indefinite integrals :

a) $\int \left(\frac{1}{2x} - \frac{2}{x^2} + \frac{3}{\sqrt{x}} \right) dx$

b) $\int x^2 (x^3 + 1)^{\frac{3}{4}} dx$

c) $\int \frac{3x-3}{(x^2-2x+6)} dx$

10) [6 points] Evaluate the following definite integrals:

a) $\int_1^6 x^2 (x-1) dx$

b) $\int_1^2 \frac{x^2}{(x^3+1)^2} dx$

11) [6 points] The marginal revenue derived from producing q units of a certain commodity is $R'(q) = 4q - 1.2q^2$ dollars per unit. If the revenue derived from producing 20 units is \$30,000, how much revenue should be expected from producing 40 units?