Prince Sultan University
MATH 211
Final Exam
Second Semester 2007/2008, Term 072
Wednesday, June 11 2008
Dr. Aiman Mukheimer

Time Allowed: <u>120 minutes</u>

Name: _____ _____ _____
(First) (Middle) (Last)

ID Number: _____

<u>Important Instructions:</u>

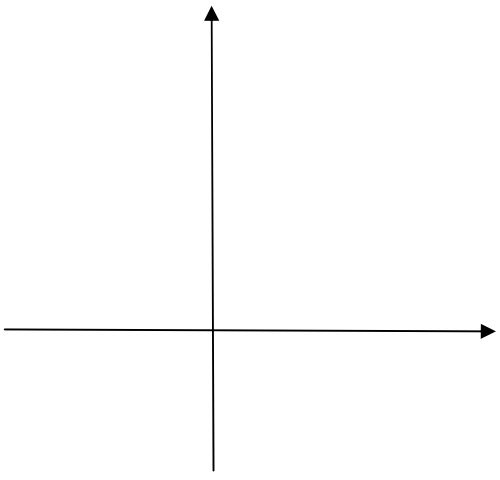
- You may use CASIO scientific calculator that does not have programming or graphing capabilities.
- You may **NOT borrow** a calculator from anyone.
- There should be **NO talking** during the examination.
- Your exam will be taken **immediately** without any warning if your mobile is seen or heard
- You must show all your work beside the problem. Be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
- This examination has **12** problems, some with several parts. Make sure that your paper has all these problems

Problems	Max points	Student's Points
1,2	14	
3,4	18	
5,6,7	20	
8,9	18	
10	12	
11,12	18	
Total	100	

Q1. (6 points) Find an equation for the tangent line to the graph of the function: $f(x) = x^2 \ln\sqrt{x}$ at the value of $x = 1$

Q2. (8 points) the total cost of producing x units of a certain commodity is given by $C(x) = \sqrt{5x + 2} + 3$.

1. Find the marginal cost and Sketch the cost curve.



2. Does the marginal cost increase or decrease with increasing production? Explain.

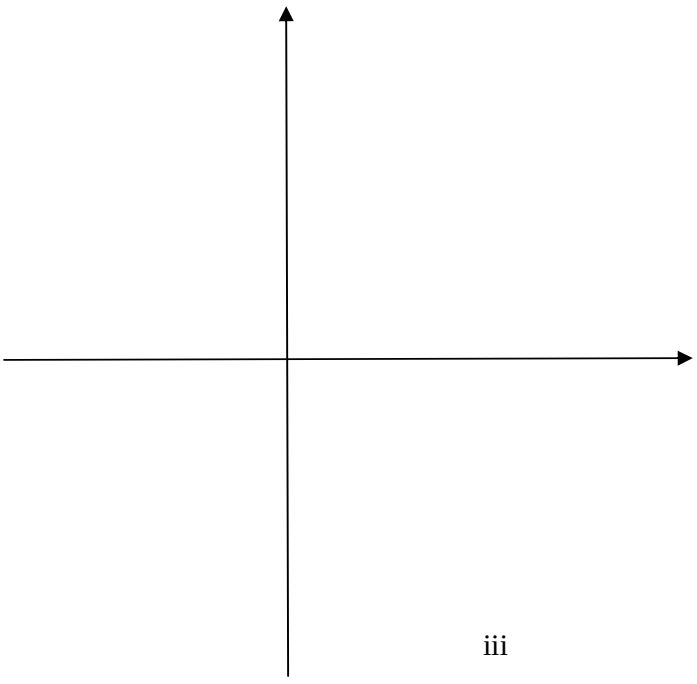
Q3. (6 points) Find the slope of the tangent line to the curve of $(x^2 + 2y)^3 = 2xy^2 + 64$ at the point $(0, 2)$.

Q4. (12 points) A business manager determines that t months after production begins on a new product, the number of produced will be P million per month, where

$$P(t) = \frac{t}{(t+1)^2}$$

1. Find $P'(t)$ and $P''(t)$

2. Sketch the graph of $P(t)$



Q5. (8 points) Find the largest and smallest values of the function $f(x) = \dfrac{\ln(x+1)}{x+1}$ on the interval; $0 \le x \le 2$.

Q6. (5 points) How much money should be invested today at 7% **compounded continuously** so that **20** years from now it will be worth $20000?

Q7. (7 points) **Sketch** the region R and then **find** the area bounded by the curves: $y = x^2$, $y = -x^2$ and the line $x = 1$.

Q8. (12 points) Evaluate the following integrals:

1. $\int (x^3 - 2x^2)(\frac{1}{x} - 5)\, dx$

2. $\int \frac{1}{\sqrt{x}\,(\sqrt{x}+1)} dx$

3. $\int_0^1 e^{-2x}(4 - e^{2x})\, dx$

Q9. (6 points) Find the second partials (including the mixed partials) for

$$f(u,v) = \ln(v^2 + u^2)$$

Q10. (12 points) Evaluate the following integrals:

1. $\int_{1}^{e^2} x \ln \sqrt[3]{x}\, dx$

2. $\int (x+5)(x+4)^6\, dx$

Q11. (10 points) The manager of a shoe store determines that the price p (dollars) for each pair of a popular brand of sports sneakers is changing at the rate of

$$p'(x) = \frac{-300x}{(x^2+9)^{3/2}}$$

when x (hundred) pairs are demanded by the consumers. When the price is \$75 per pair, 400 pairs ($x = 4$) are demanded by consumers.

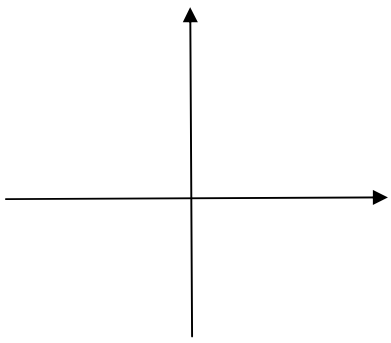
1. Find the demand (price) function $p(x)$.

2. At what price will 500 pairs of sneakers be demanded?

3. How many pairs will be demanded at a price of \$90 per pair?

Q12. (8 points) Describe **and** sketch the <u>domain</u> for the following functions:

1. $f(x, y) = x^2 - 4xy\sqrt{4 - x^2 - y^2}$



2. $f(x, y) = \dfrac{e^{xy}}{\ln(2 - x + y)}$