PRINCE SULTAN UNIVERSITY

MATH 211 BUSINESS CALCULUS

MAJOR EXAM 1 10th MARCH 2012

Start: **4:00 p.m.**
End: **5:30 p.m.**

Name: _____

I.D. **Instructors Name:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 4 Question Sheets.
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
TOTAL POINTS		
TOTAL		

1) [4 points] Find the domain of $f(x)=\dfrac{\sqrt{x-2}}{x-4}$

2) [4 points] A manufacturer determines that the total cost of manufacturing q units is given by $C(q)=q^3-3q^2$. Find the cost of manufacturing the 10^{th} unit

3) [4 points] A car rental agency charges $75 per day plus 70 cents per mile. Express the cost C of renting a car for one day as a function of the numbers of miles driven x. Find the cost of renting a car for a two day trip of 100 miles.

4) [6 points] The supply and demand function for a commodity are given by $S(x)=x^2+10$ and $D(x)=130-2x$. At what level of production x and unit price p is market equilibrium achieved.

5) [10 points] A manufacturer can sell TV's for $500 apiece. The manufacturers total cost consists of a fixed overhead of $9000 plus production costs of $250 per TV.

   a) How many TV's must be sold to break even?

   b) What is the profit or loss if 30 TV's are sold?

   c) How many TV's must be sold to realize a profit of $2250?

6) [6 points] Use a table of at least four values to estimate the following limit:

$$\lim_{x\to 2} \frac{x^3-8}{x^2-4}$$

7) [8 points] Find the value of the following limits:

a) $\lim_{x\to 3} \frac{x^2+5x+6}{x^2-9}$

b) $\lim_{x\to 9} \frac{\sqrt{x}-3}{x-9}$

c) $\lim_{x\to \infty} \frac{-12x^4+500x^3-x^5+7x}{2x^2-12x}$

d) $\lim_{x\to -\infty} \frac{2x^2+x}{4x^4+4}$

8) [6 points] Find the value of k that will make the function continuous everywhere:

$$f(x)=\begin{cases} x+2k & x\le 1 \\ kx^2+x+1 & x>1 \end{cases}$$

9) [6 points] Find the **coordinates** of all the points on the graph of $y = x^2(x-5)^3$ where the tangent line is horizontal.

10) [6 points] Find the equation of the tangent line to the graph of $y = x^2 + 4x - 2$ at $x = 1$.

11) [9 points] Differentiate the following functions:

a) $f(x) = \sqrt{x^3 + 8x - 8}$

b) $f(x) = x^{\frac{1}{3}} - \frac{4}{x^{\frac{2}{5}}} + 33x$

c) $f(x) = \left(\frac{1}{x} + 4\right)^{100}$

12) [4 points] Given that $f(x)=\dfrac{x}{\left(x^2+2\right)^2}$, find $f''(x)$

13) [8 points] The total investments of a certain company can be modelled by $I(t)=3t^2+2\sqrt{t}+12$ million dollars, t years after 2005.

a) At what rate was the investment changing with respect to time in 2009?

b) By how much did the investment change between 2009 and 2005?

c) At what percentage rate was the investment changing with respect to time in 2009?