

King Fahd University of Petroleum and Minerals
Department of Math & Stat
MATH 132 – Applied Calculus
EXAM I
2010-2011 (102)

Saturday, March 26, 2011

Time Allowed: 2 hours

Name: _____ Serial #: _____

ID #: _____ Section #: _____

Instructions:

1. **Calculators and Mobiles are not allowed.**
2. Write neatly and legibly. You may lose points for messy work.
3. **Show all your work.** No points for answers without justification.
4. Make sure that you have 8 different problems (8 pages + cover page)

Problem No. #	Grade	Maximum Points
1		12
2		12
3		12
4		12
5		12
6		12
7		14
8		14
Total		100

1. (a) (6 points) Find $\lim_{x \rightarrow 1} \frac{1}{(x-1)} \left[\frac{1}{x+3} - \frac{2}{3x+5} \right]$.

(b) (6 points) Evaluate: $\lim_{x \rightarrow -1^+} \frac{7-2x}{2x^2-5x-7}$. (Use $+\infty$ or $-\infty$, if appropriate).

2. (a) (6 points) Let

$$f(x) = \begin{cases} 2x + 3 & x \leq 4 \\ 7 + \frac{16}{x} & x > 4. \end{cases}$$

Is $f(x)$ continuous at $x = 4$? Give reasons in support of your answer.

(b) (6 points) For $f(x) = \frac{x^2 - x - 2}{x^2 - 2x}$, find point(s) of discontinuity.

3. (12 points) Use definition to find derivative of $f(x) = \sqrt{x^2 - 3}$.

4. (a) (6 points) The cost function for a manufacturer is given by

$$c = \frac{6q^2}{q+2} + 6000.$$

Find the marginal-cost when 10 items are produced.

- (b) (6 points) Let $z = 4y^2 - 2y + 7$, $y = \ln(2 - x^2)$ and $x = e^{1-\frac{1}{t}}$. Use the chain rule to evaluate $\left. \frac{dz}{dt} \right|_{t=1}$.

5. (a) (8 points) Find an equation for the tangent line to the curve $x^3 + y^3 = 3xy$ at $\left(\frac{3}{2}, \frac{3}{2}\right)$.

(b) (4 points) At what points the tangent line obtained above is horizontal?

6. (a) (6 points) For $y = e^{x+\ln^3(1-2x)}$, find $\frac{dy}{dx}$.

(b) (6 points) Let $y = \frac{2x^3 + 1}{3x^2}$. Use logarithmic differentiation to evaluate $y'(0)$.

7. (14 points) For $f(s) = s(1 - s^2)^3$, find $f''(2)$.

8. (14 points) A manufacturer employs m workers to produce $q = \frac{m}{\sqrt{m+5}}$ units of a product. If the demand equation for the product is $p = \frac{10}{q+2}$, then find the marginal-revenue product when $m = 20$.