

King Fahd University of Petroleum and Minerals  
Dhahran 31261  
Department of Mathematical Sciences

**MATH 132 – 03, 04 & 06 (061)**  
**Major Exam I**  
**October 9<sup>th</sup>, 2006**  
**Instructor: Dr. A. Umar**

Duration	1hr 20 mins
Time	

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Name: \_\_\_\_\_

ID Number: \_\_\_\_\_ Encircle Your Section: 03 or 04 or 06 (minus 5 points if you don't)

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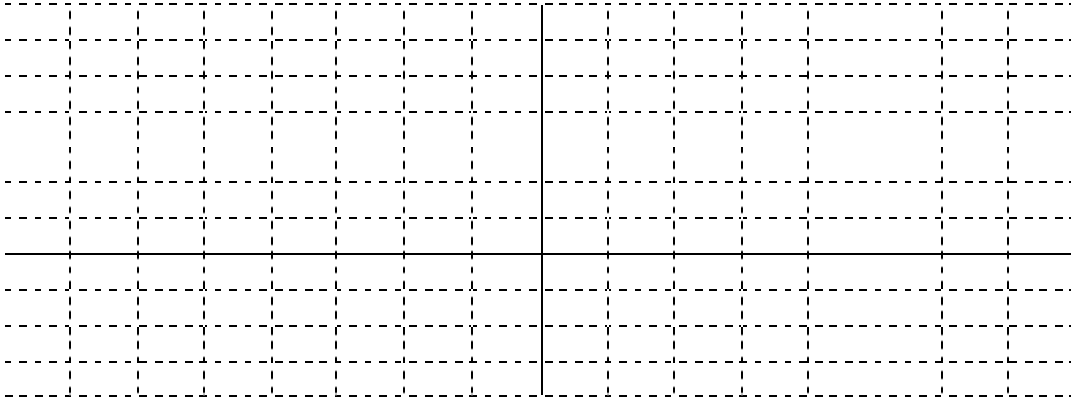
**Notes:**

1. Students must have a valid KFUPM ID Card with them.
2. You must show all your work to justify your answers.  
Be as organized as possible. Only neat and logical solutions will attract points.
3. Programmable calculators and mobile phones are NOT allowed.
4. Scratch papers are attached at the end of this question paper. **PLEASE, DO NOT REMOVE THEM.**

PAGE	Points
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7	
Total	

**Q1.**Sketch the graph of  $f(x) = \lceil x/2 \rceil$  and evaluate:

[8 pts]



$$(a) \lim_{x \rightarrow 3^-} f(x) = \lim_{x \rightarrow 3^-} =$$

[2 pts]

$$(b) \lim_{x \rightarrow 1^+} f(x) = \lim_{x \rightarrow 1^+} =$$

[2 pts]

$$(c) \lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^+} =$$

[2 pts]

$$(d) \lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} =$$

[2 pts]

(e) List or describe all the discontinuities of  $f(x)$ :

[4 pts]

**Q2.**

(a) The population of a certain small city ( $t$  years from now) is predicted to be

$$P = 125,000 + \frac{25,000}{(t+3)^2}.$$

Find the population of the city in the long run; that is, find  $P$  as  $t$  increases without bound.

[3 pts]

(b) If  $f(x)$  is a continuous function and  $\lim_{x \rightarrow 3} g(x) = 3$ ,  $\lim_{x \rightarrow 3} [f(x) + g(x)] = 2$ , find  $f(3)$ .

[3 pts]

(c) Find  $\lim_{x \rightarrow 8} \frac{\sqrt[3]{x} - 2}{x - 8}$  if it exists. [Hint:  $x - 8 = (\sqrt[3]{x})^3 - 2^3$ .]

[3 pts]

(d) Complete the following:

$$\lim_{x \rightarrow \infty} \frac{c_m x^m + c_{m-1} x^{m-1} + \dots + c_1 x + c_0}{d_n x^n + d_{n-1} x^{n-1} + \dots + d_1 x + d_0} = \lim_{x \rightarrow \infty} \text{—————} = \begin{cases} \text{if } m < n \\ \text{if } m = n \\ \text{if } m > n. \end{cases}$$

[9 pts]

**Q3.** The equation of the tangent line to the curve  $y = x^{3/2}$  when  $x = 0.36$  is

[ pts]

**Q4.** If  $V(z) = (\frac{3}{8}z^{8/3} - \frac{5}{6}z^{-6/5})(z^{3/2} + z^{-1/2})$  then  $V'(z)\Big|_{z=1}$  is

[12 pts]

**Q5.** If a manufacturer's fixed costs are SR150, 000 and variable cost per unit is SR 200, find his average cost and marginal cost when  $q = 50$ .

[12 pts]

**Q6.** If  $f(t) = \frac{2}{2t+1}$ , find  $\lim_{h \rightarrow 0} \frac{f(-1+h) - f(-1)}{h}$ . What does this limit represent?  
[15 pts]

**Q7.** If the demand and supply functions for a manufacturer are  $q = \frac{1000 + 5p}{p}$  and  $q = \frac{1000 - 15p}{p}$ , respectively, find the marginal revenue function. [15 pts]

**Scratch Paper I. PLEASE DO NOT REMOVE.**

**Scratch Paper II. PLEASE DO NOT REMOVE.**