King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 101.09 and 13   Exam I   Semester I 2001–2002(011)

ID #: _____   NAME: _____

Section # _____

1. Evaluate the limits

   (a) $\lim\limits_{x \to 0^+} \left(\dfrac{1}{x} - \dfrac{1}{x^2} \right)$.

   (b) $\lim\limits_{x \to 0} \dfrac{\left[\frac{1}{1+x} \right] - 1}{x}$.

   (c) $\lim\limits_{x \to -\infty} x \left(1 - \cos\dfrac{1}{x} \right)$.

(d) $\lim_{x \to -\infty} \left(\sqrt{x^2 + ax} - \sqrt{x^2 + bx} \right)$.

(e) $\lim_{x \to 0} \dfrac{x \sin x}{1 - \cos x}$.

2. Find the values of a and b so that the function

$$f(x) = \begin{cases} 2 & \text{if } x \leq -1 \\ ax + b & \text{if } -1 < x < 3 \\ -2 & \text{if } x \geq 3 \end{cases}$$

is continuous everywhere.

3. The tangent line to the graph of $y = g(x)$ at the point $(5, 2)$ passes through the point $(9, 0)$. Find $g(5)$ and $g'(5)$.

4. Given $f(x) = \sqrt[3]{x}$, find $f'(x)$ and its domain.