

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 101.13 Exam I Semester II 2001-2002(012)

ID #: _____ NAME: _____

Section # _____

1. Find each of the following limits if it exists:

(a) $\lim_{x \rightarrow 2} \frac{|x-2|}{x^2 - x - 2}$.

(b) $\lim_{x \rightarrow 8} \frac{x^{2/3} - 4}{x^{1/3} - 2}$.

(c) $\lim_{x \rightarrow 0} x^2 \sin \frac{1}{x}$.

$$(d) \lim_{x \rightarrow \infty} \frac{3x + 2\sqrt{e}}{1 - x}.$$

$$(e) \lim_{x \rightarrow 0} x^2 (\csc x \cot x).$$

$$(f) \lim_{x \rightarrow 0} \cos \left(\frac{\pi - \cos^2 x}{x^2} \right).$$

2. Given $f(x) = \begin{cases} \frac{x^2 - x}{x^2 - 1} & \text{if } x \neq 1, -1 \\ k & \text{if } x = 1 \\ m & \text{if } x = -1 \end{cases}$.

(a) Find $\lim_{x \rightarrow 1} f(x)$.

(b) Find $\lim_{x \rightarrow -1} f(x)$.

(c) Find k , if any, so that f is continuous at $x = 1$.

(d) Find m , if any, so that f is continuous at $x = -1$.

3. (a) Use the definition of the derivative to find $f'(x)$ if $f(x) = \frac{1}{x^2}$.

(b) Find the equation of the tangent line to $y = \frac{1}{x^2}$ at $(-1, 1)$.