College of Sciences	King Fahd University of Petroleum & Minerals	Department of Mathematical Sciences	
Name:	**Quiz-2 Form B** **MATH-101**	**ID:**	SEC: **11 28**

1) $\lim_{x \to 0} \frac{x}{\cos x} = \frac{0}{\cos(0)} = \frac{0}{1} = 0$ 3/3

$\boxed{\text{a) } 0}$ b) 1 c) -1 d) $+\infty$ e) $-\infty$

2) $\lim_{x \to 0} \frac{2x + \sin x}{x} = \lim_{x \to 0} \frac{2x}{x} + \lim_{x \to 0} \frac{\sin x}{x} = \lim_{x \to 0} (2) + \lim_{x \to 0} \frac{\sin x}{x} = 2 + 1 = 3$

a) 0 b) 1 c) 2 $\boxed{\text{d) } 3}$ e) $+\infty$ 3/3

True of False

3 each

3) If f has a removable discontinuity at x_0 then f is not differentiable at x_0.	T
4) If $\lim_{x \to x_0^+} f(x)$ does not exist then $f'_+(x_0)$ does not exit.	T
5) It is possible to find a function f with $\lim_{x \to x_0^+} f(x) = 1$ and $f'_-(x_0)$ does not exist.	T
6) It is impossible to find a function f with $f'_+(x_0) = 3$ and $\lim_{x \to x_0^+} f(x) = +\infty$.	T

16/16

7) Find $\lim_{x \to +\infty} \frac{2x + x\sin(3x)}{5x^2 - 2x + 1} = \lim \frac{2x}{5x^2 - 2x + 1} + \lim \frac{x\sin(3x)}{5x^2 - 2x + 1}$

$= A + B$

$= 0 + 0 = 0$

$A = \lim \frac{2x}{5x^2 - 2x + 1} = \lim \frac{2x/x^2}{5 - 2/x + 1/x^2} = 0$

$B = \lim \frac{x\sin(3x)/x^2}{5 - 2/x + 1/x^2} = \lim \frac{\sin(3x)/x}{5 - \frac{2}{x} + \frac{1}{x^2}} = \frac{0}{5 - 0 + 0} = 0$

Now, $\lim_{x \to +\infty} \frac{\sin(3x)}{x} = 0$ (why)

$-1 \le \sin(3x) \le 1$

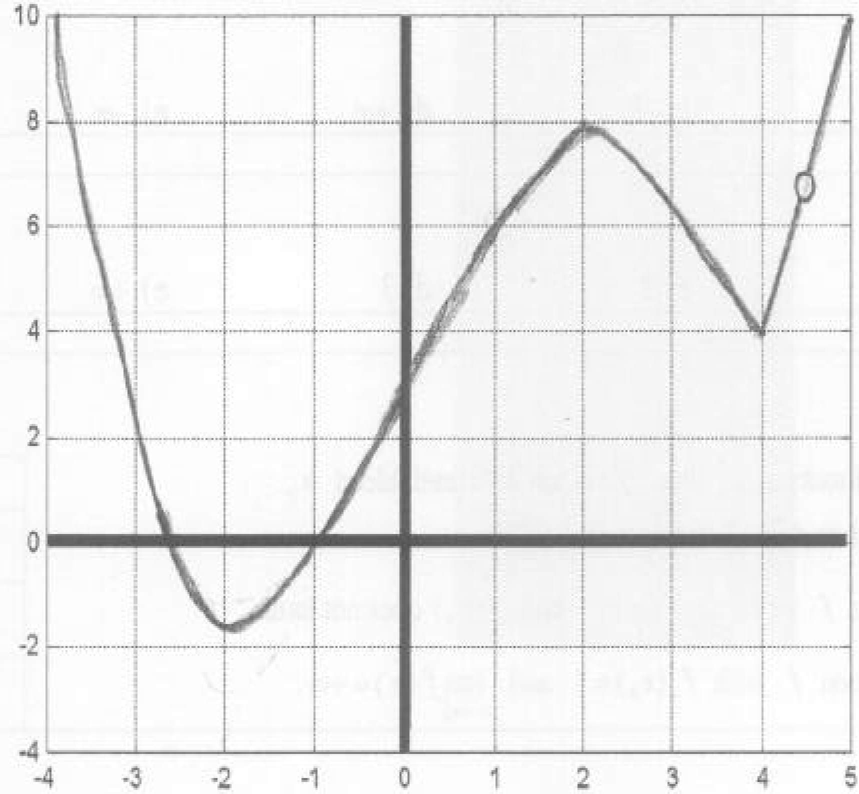
$-\frac{1}{x} \le \frac{\sin(3x)}{x} \le \frac{1}{x}$ (x is positive large)

$\lim_{x \to +\infty} (-\frac{1}{x}) \le \lim_{x \to +\infty} (\frac{\sin 3x}{x}) \le \lim_{x \to +\infty} \frac{1}{x}$

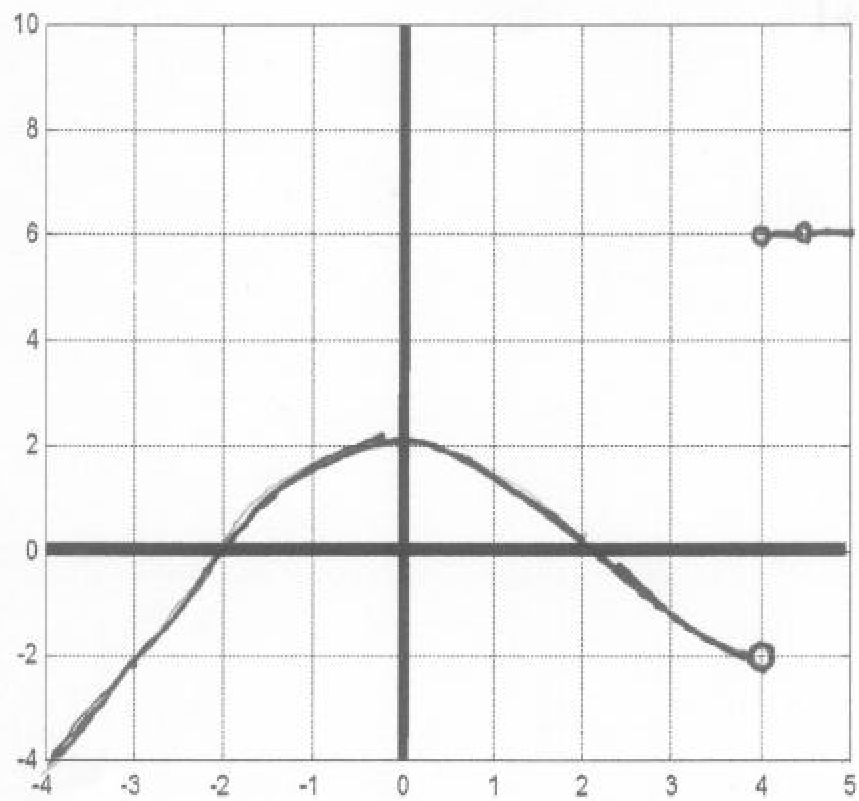
$0 \le \lim_{x \to +\infty} (\frac{\sin 3x}{x}) \le 0$ (by squeezing)

8) Sketch the graph of the derivative of the function whose graph is shown.

Form B



$f(x)$



$f'(x)$

negative zero positive zero negative hole line hole