جامعة الملك سعود
King Saud University

Name: Answer Sheet (Dr Borhen)
ID:............................
Num of attendance:.....

Time: 45 min

Quiz 2 - Math 218 - Semester I - 1444 H

Marks: 10

Question	1	2	3	4	5	6	7	8	9	10
Answer	C	A	B	D	C	D	B	B	B	D

I) Choose the correct answer (write it in the table above):

1) $\lim_{x\to1}\frac{x^2-1}{x-1} = \lim_{x\to1}\frac{\cancel{(x-1)}(x+1)}{\cancel{(x-1)}} = 2$

(a) 0	(b) 1	(c) 2	(d) 3

2) $\lim_{x\to0} x^2\sin(\frac{1}{x}) = 0$ because $-1 \le \sin(\frac{1}{x}) \le 1$

$-x^2 \le x^2\sin(\frac{1}{x}) \le x^2$

$\lim_{x\to0} x^2 = 0$

(a) 0	(b) 1	(c) 2	(d) 3

3) $\lim_{x\to\infty}\frac{x+4x^2}{1-2x^2} = \lim_{x\to\infty}\frac{\cancel{x^2}(\frac{1}{x}+4)}{\cancel{x^2}(1/x^2-2)} = \frac{4}{-2} = -2$

(a) -4	(b) -2	(c) 2	(d) 4

4) $\lim_{x\to4}\frac{x^2-2x-8}{x-4} = \frac{0}{0} = \lim_{x\to4}\frac{\cancel{(x-4)}(x+2)}{\cancel{(x-4)}} = 6$

(a) ∞	(b) 2	(c) 4	(d) 6

5) $\lim_{x\to0}\frac{(3+x)^2-9}{x} = \frac{0}{0} = \lim_{x\to0}\frac{\cancel{9}+x^2+6x-\cancel{9}}{x} = \lim_{x\to0}(x+6) = 6$

(a) 0	(b) 3	(c) 6	(d) 9

$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

$\frac{|x|}{x} = \begin{cases} 1 & \text{if } x > 0 \\ -1 & \text{if } x < 0 \end{cases}$

6) $\lim_{x \to 0} \frac{|x|}{x} =$

(a) -1	(b) 0	(c) 1	(d) doesn't exist

7) If $f(x) = \frac{1}{\sqrt{1-x^2}}$ then f is continuous on the interval $D_f = \{x \in \mathbb{R} / 1 - x^2 > 0\}$

$= (-1, 1)$

(a) $(-\infty, -1)$	(b) $(-1, 1)$	(c) $[-1, 1]$	(d) $(1, +\infty)$

8) If $f(x) = \sqrt{2 + x^2}$ then $f'(\sqrt{2}) =$ $\frac{\sqrt{2}}{\sqrt{2+2}} = \frac{\sqrt{2}}{2}$

$f'(x) = \frac{\cancel{2}x}{\cancel{2}\sqrt{2+x^2}}$

(a) $\frac{1}{2}$	(b) $\frac{\sqrt{2}}{2}$	(c) $\frac{\sqrt{2}}{4}$	(d) 2

9) If f is a differentiable function and $f(1) = 1$, $f'(1) = 1$, and $g(x) = xf(x)$ then $g'(1) =$

$g'(x) = f(x) + x f'(x)$ So $g'(1) = f(1) + f'(1)$

(a) 1	(b) 2	(c) 6	(d) 7

10) The slope of the tangent line to the graph $f(x) = 3x^2 + 2$ at the point $P(1, 5)$ is

(a) 1	(b) 3	(c) 5	(d) 6

Eq of tangent T_P : $y - 5 = \underbrace{f'(1)}_{\text{slope}} (x - 1)$

$f'(x) = 6x$

$f'(1) = 6$

II) A) Differentiate the following functions:

i) $f(x) = 2x^5 - 5x^2 + \sqrt{x}$.

1 $$f'(x) = 10x^4 - 10x + \frac{1}{2\sqrt{x}}$$

ii) $g(x) = (x + x^2)e^{3x}$. (product of 2 functions)

1 $$g'(x) = (1+2x)\,e^{3x} + (x+x^2)(3)\,e^{3x}$$

$$g'(x) = [3x^2+5x+1]\,e^{3x}$$

iii) $h(x) = \frac{\sin x}{2+\cos x}$. (quotient of 2 functions)

1 $$h'(x) = \frac{(\cos x)(2+\cos x) - (\sin x)(-\sin x)}{(2+\cos x)^2} = \frac{2\cos x + \cos^2 x + \sin^2}{(2+\cos x)^2}$$

$$h'(x) = \frac{2\cos x + 1}{(2+\cos x)^2}$$

iv) $k(x) = [\ln(1 + x^3)]^4$. (Chain Rule)

1 $$k'(x) = 4(\ln(1+x^3))^3 \frac{d}{dx}\ln(1+x^3)$$

$$k'(x) = 4(\ln(1+x^3))^3\left(\frac{3x^2}{1+x^3}\right)$$

B) Find an equation of tangent line for the curve $y = 3^x$ at the point $P(0, 1)$.

The equation of tangent line is

$$T_p : y - 1 = \frac{d}{dx}(3^x)\Big|_{x=0}(x-0)$$

1 $$T_p : y = (\ln 3)\,x + 1$$