College of Sciences	King Fahd University of Petroleum & Minerals	Department of Mathematical Sciences	
Name: KEY	**Quiz-3 Form A** **MATH 101**	**ID:** KEY	SEC: **11** **28**

(Success is a Journey). Say a prayer and START

7 each

1) If $g(x)=\frac{f(x)}{x}$ and $f(-1)=1$ and $f'(-1)=2$ then $g'(-1)=$

(39/198)3.4 a) -3 A b) -2 c) -1 d) 0 e) 1 B

$g'(x)=\frac{x f'(x)-f(x)}{x^2} \Rightarrow g'(-1)=-3\ ,\ g'(1)=1$

2) If $f(x)=\frac{\cot x}{1+\csc x}$ then $f'(\frac{\pi}{2})=$

(13) 3.4 a) $\frac{-1}{2}$ A b) $\frac{3}{2}$ c) $\frac{1}{2}$ d) $\frac{-2}{3}$ B e) 0

$f'(\frac{\pi}{6})=-\frac{2}{1+2}=-\frac{2}{3} \Leftarrow f'(x)=-\frac{\csc x}{1+\csc x} \Rightarrow f'(\frac{\pi}{2})=\frac{-1}{1+1}=\frac{-1}{2}$

3) If $f(x)=x\sin x-3\cos x$ then $f''(\frac{\pi}{2})=$

(21) 3.4 a) $\frac{\pi}{2}$ b) $\frac{-\pi}{2}$ A c) 5 B d) -3 e) 0

$f''(0)=0+5=5 \Leftarrow f''(x)=-x\sin x+5\cos x \Rightarrow f''(\frac{\pi}{2})=-\frac{\pi}{2}+0=\frac{-\pi}{2}$

4) If $y=x\cos(5x)-\sin^2 x$ then $y''(0)=$

(51) 3.4 a) 0 b) -2 A c) $25\pi-2$ B d) 25π e) 2

$y''(\pi)=25\pi-0-2=25\pi-2 \Leftarrow y'(x)=-25x\cos(5x)-10\sin(5x)-2\cos(2x) \Rightarrow y''(0)=0-0-2=-2$

5) Given that $\frac{d}{dx}[f(3x)]=6x$ then $f'(9)=$

(73) 3.5 a) 2 B b) 3 c) 4 d) 5 e) 6 A

$\frac{d}{dx}[f(3x)]=6x$

$f'(3x)\cdot 3=6x$

$\Rightarrow f'(3x)=\frac{6x}{3}$

$\Rightarrow f'(3x)=2x$ —(*)

Let $x=3$ in (*) $\Rightarrow f'(9)=6$

Let $x=1$ in (*) $\Rightarrow f'(3)=2$

6)
(22) 3.6 For $x^3 + y^3 = 1$, use implicit differentiation to find $\frac{d^2y}{dx^2}$ (show ALL your work). 15

$3x^2 + 3y^2 \cdot y' = 0 \Rightarrow x^2 + y^2 y' = 0$

$\boxed{y' = -\frac{x^2}{y^2}}$ 3

$y'' = -\frac{(x^2)'y^2 - (y^2)'x^2}{y^4}$

$= -\frac{2x\,y^2 - 2y \cdot y' x^2}{y^4}$ 4

subsitute y'

$= -\frac{2xy^2 - 2y(-\frac{x^2}{y^2})x^2}{y^4}$ 4

$= -\frac{2xy^2 + 2\frac{x^4}{y}}{y^4}$ $\times \frac{y}{y}$

$= -\frac{2xy^3 + 2x^4}{y^5} = -\frac{2x(y^3 + x^3)}{y^5}$

but $x^3 + y^3 = 1$

$\Rightarrow \boxed{y'' = -\frac{2x}{y^5}}$ 4

Happy Eid