Name: UgHovero precious Efezino

Matric NO: 19/MHS11/142

Department: pharmacy

1.) $y = \frac{1}{x-2}$

The function is defined for all real numbers except $x = 2$

- The domain is the set of real numbers except $x = 2$

- The codomain or the set of real numbers except $y = 0$

2.) $k = \ln v$

$\frac{dk}{dv} = \frac{1}{v}$

3a.) $2x - 3y - 2 = 0$

$-3y = 2 - 2x$

$y = \frac{2-2x}{3}$

$y = \frac{2x+2}{3}$; $\frac{2}{3}(x+1)$

b) $x^2 + y^2 = 4$

$y^2 = 4 - x^2$

$y = \pm\sqrt{4 - x^2}$

4) find dp/dt, $p = \sin^{-1} t$

$p = \frac{t}{\sin}$; $t = \sin p$

$\frac{dt}{dp} = \cos p$; $\frac{dp}{dt} = \frac{1}{\cos p}$

Recall, $\cos^2 y + \sin^2 y = 1$

$\cos y = \pm\sqrt{1 + \sin^2 y}$ $t = \sin p$

$\therefore \cos p = \sqrt{1 - t^2}$

Hence, $dp/dt = 1/(1 - t^2)$

5.) $f(x) = 2x^2 - 5$; $g(x) = 4x - 2$

$Fog(x) = 2(4x-2)^2 - 5 = 2(16x^2 - 16x + 4) - 5$

$= 32x^2 - 32x + 8 - 5 = 32x^2 - 32x + 3$

$gof(x) = 4(2x^2 - 5) - 2 = 8x^2 - 20 - 2 = 8x^2 - 22$

6) Show that $F(x) = Fe(x) + Fo(x)$

$f(x) = 3x^2 - 2x + 1$

$Fe(x) = \frac{f(x) + f(-x)}{2}$

$f(-x) = 3(-x)^2 - 2(-x) + 1$

$= 3x^2 + 2x + 1$

$fe(x) = \frac{3x^2 - 2x + 1 + (3x^2 + 2x + 1)}{2}$

$= \frac{6x^2 + 2}{2} = 3x^2 + 1$

$f(x) = \frac{3x^2 - 2x + 1 - (3x^2 + 2x + 1)}{2}$

$\therefore -4x/2 = -2x$

$Fe(x) + f(x) = 3x^2 + 1 - 2x$

$= 3x^2 - 2x + 1$

7) Differentiate $y = \cos x$

$y + \delta y = \cos(x + \delta x)$

$\delta y = \cos(x + \delta x) - \cos x \quad y = \cos x)$ — 1

Recall

$\cos(A+B) - \cos(A-B) = -2\sin A \sin B$ — 2

Comparing 1 & 2

$A + B = x + \delta x$ — 3

$A - B = x$ — 4

Adding 3 & 4 & subtracting 3 & 4

$2A + 2x + \delta x$

$A = \frac{2x + \delta x}{2}$ & $\boxed{B = \delta x / 2}$

$\boxed{A = x + \delta x/2}$

Comparing ① & ②

$= \cos(x + \delta x) - \cos = -2\sin(x + \delta x/2) \sin(\delta x/2)$

Dividing through by δx

$\frac{\delta y}{\delta x} = \frac{-2\sin(x + \delta x/2) \sin(\delta x/2)}{\delta x}$

$\delta y/\delta x = \frac{-\sin(x + \delta x/2) \sin(\delta x/2)}{\delta x/2}$

$= -\sin(x + \delta x/2) \times \frac{\sin(\delta x/2)}{\delta x/2}$

Taking limit $\delta x = 0$

$\lim_{\delta x \to 0} \frac{\sin \delta x/2}{\delta x/2} = 1$

$\delta y/\delta x = -\sin(x + 0/2) \times 1$

$\delta y/\delta x = -\sin x$

8i) $y = 3t^2$; $x = 1/t^2 \; t^{-2}$

$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$

$= dy/dt \div dx/dt$

$dy/dt = 6t$; $dx/dt = -2/t^3$

$dy/dx = 6t \div -2/t^3$

$= \cancel{6t \times \frac{-2}{t^3}} = -\frac{6x - 2}{t^2} = \frac{12}{t^2}$

$dy/dx = -12/t^2$

9) $y = x^2 \cos 2x \, e^{4x}$

solution

Taking $\log x$ of both sides

$\ln y = \ln x^2 + \ln \cos 2x + \ln e^{4x}$

Differentiating both w.r.t x

$\frac{1}{y} \frac{dy}{dx} = \frac{1}{x^2}(2x) + \frac{1 \, (-2\sin 2x)}{\cos 2x}$

$+4$

$\frac{1}{y} \frac{dy}{dx} = \frac{2}{x} - \frac{2\sin 2x}{\cos 2x} + 4$

multiplying both sides by y

$\frac{dy}{dx} = y\left(\frac{2}{x} - \frac{2\sin 2x}{\cos 2x} + 4\right)$

$= x^2 \cos 2x \, e^{4x} \times \frac{2}{x} - \frac{2\sin x}{\cos x} + 4$

10) $y = \sin(3x^3 + 5)$

Let $u = 3x^3 + 5$

$dy/dx = \cos u$

$du/dx = dy/du \times du/dx$

$= \cos u \times 9x^2$

$= 9x^2 \cos u = 9x^2 \cos 3x^3 + 5$