DEPARTMENT: PHARMACY

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MAT No: 19/MHS11/025

1) $y = 1/x-2$

- The function is defined for all real numbers except 2
- The domain is the set of real numbers except $x = 2$
- The co domain is the set of real numbers except $y = 0$

2) $K = \ln V$

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

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

$$-3y = 2 - 2x$$

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

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

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

$$y^2 = 4 - x^2$$

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

6) $f(x) = 3x^2 - 2x + 1 = 0$

$f_e(x) + f_o(x) = f(x)$

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

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

$3x^2 + 2x + 1$

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

$$Fe(x) = \cancel{3x^2}\ \frac{6x^2 + 2}{2}$$

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

$$F_o(x) = \frac{F(x) - f(-x)}{2}$$

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

$\cancel{3x^2} - 2x + \cancel{1} - \cancel{3x^2} - 2x -$

$$\frac{-4x}{\cancel{2}}$$

$F_o(x) = -2x$

$\therefore F(x) = Fe(x) + f_o(x)$

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

7) $y = \cos x$

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

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

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

$A + B = x + \delta x$

$A - B = x$

$2A = 2x + \delta x$, $A = x + \delta x/2$, $B = \delta x/2$

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

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

$$\delta y/\delta x = \frac{-\sin\langle x+\delta x/2\rangle \sin\langle \delta x/2\rangle}{\delta x/2}$$

taking limit $\delta x \to 0$

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

$$\delta y/\delta x = -\sin\langle x + 0/2\rangle \times 1$$

limsin

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

8) $y = 3t^2$, $x = 1/t^2$

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

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

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

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

$\log_e$ of both sides

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

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

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

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

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

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

Let $u = 3x^3 + 5$

$$\frac{dy}{du} = \cos u$$

$$\frac{du}{dx} = 9x^2$$

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

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

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

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

6)

F

4) $p = \sin^{-1} t$

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

$t = \sin p$

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

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

recall $\cos^2 y + \sin^2 y = 1$

$\cos^2 y = 1 - \sin^2 y$

$\cos y = \sqrt{1 - \sin^2 y}$, $\sin p = t$, $\sin^2 p = t^2$

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

$\cancel{\frac{dy}{dx} = \frac{1}{\cos p} = \frac{1}{\sqrt{1-t^2}}}$ $\frac{dy}{dt} = \frac{1}{\cos p} = \frac{1}{\sqrt{1-t^2}}$

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

$fog(x) = f(4x-2)$

$2(4x-2)^2 - 5$

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

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

$fog(x) = 32x^2 - 32x + 3$

$gof(x) = g(2x^2 - 5)$

$4(2x^2 - 5) - 2$

$8x^2 - 20 - 2$

$gof(x) = 8x^2 - 22$