ADENUOYE TOMISIN ESTHER
19/MHS11/009
PHARMACY
MAT 704.

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 is a set of real numbers except $y = 0$.

2. $K = \ln V$

$\frac{dK}{dV} = \frac{1}{V}$

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

$-3y = 2 - 2x$

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

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

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

$y^2 = 4 - x^2$

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

$y = \pm 2 - x$

$= +2 - x$ or $-2 - x$

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

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

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

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

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

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

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

$= 3x^2 + 1$

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

$= -4x/2$

$= -2x$

$f_e(x) + f_o(x) = 3x^2 + 1 - 2x$

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

(7) Differentiate $y = \cos x$

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

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

$y = \cos x$

Recall

$\cos(A+B) - \cos(A-B)$

$= -2 \sin A \sin B$ — (ii)

Comparing (i) & (ii)

$A + B = x + \delta x$ — (iii)

$A - B = x$ — (iv)

Adding (iii) & (iv)

$2A = 2x + \delta x$

$A = \frac{2x + \delta x}{2}$

$A = x + \delta x/2$

$B = \delta x/2$

Comparing (i) & (ii)

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

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

Dividing through by δx

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

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

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

Taking limit $\delta x \to 0$

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

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

$\lim \delta x \to 0$

$\frac{dy}{dx} = -\sin x$

$\therefore \frac{dy}{dx} = -\sin x$

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

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

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

$\frac{dy}{dt} = 6t$; $\frac{dx}{dt} = \frac{-2}{t^3}$

$\frac{dy}{dx} = 6t \div \frac{-2}{t^3}$

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

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

$= \frac{-12}{t^2}$

$\frac{dy}{dx} = \frac{-12}{t^2}$

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

Solution:-

Taking $\log_e$ of both sides

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

Differentiating both sides w.r.t x

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

$+ 4$

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1. $y = \frac{1}{(x-}$

→ The func all real $x = 2$

→ The d real

→ The c real n

2. $K =$

$\frac{dK}{dv}$

3. (a)

MAT 704.

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

multiplying both sides by y

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

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

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

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

let $u = 3x^3 + 5$

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

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

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

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

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

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