8) $\frac{dy}{dx}$ if $y = 3t^2$ $x = 1/t^2$

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

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

$$\frac{dy}{dt} = 6t$$

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

$$\frac{dy}{dx} = \frac{6t}{1/t^2}$$

$$= -3t^4$$

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

$$d/dx(\ln y) = d/dx(\ln x^2) + d/dx(\ln \cos 2x) + d/dx(\ln e^{4x})$$

$$1/y\,(dy/dx) = 1/x^2\,(2x) + 1(+\sin 2x)/\cos 2x + (e^{4x})$$

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

$$= \frac{dy}{dx} = x^2 \cos 2x\, e^{4x} \frac{(2x^2 - \sin 2x + 1)}{(x \cos 2x)}$$

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

$u = 3x^3 + 5$

$y = \ln u$

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

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

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

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

$\frac{dy}{dx} = 9x^2 \cos u$

but $u = 3x^3 + 5$

$\frac{dy}{dx} = 9x^2 \cos(3x^3 + 5)$

ADEBIMPE BASIT BANJI
MAT 104
19/MHS11/006
PHARMACY

1) for what value of x is function $y = 1/(x-2)$ defined? State the domain and co-domain

Ans $y = 1/x-2$. function is defined for all real numbers except $x-2$

domain: all real number of x except 2

Co domain: all real numbers of y

2) If $K = \ln v$ differentiate K

$$\frac{d}{dK}(\ln v) = \frac{1}{v}$$

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

$2x - 3y = 2$

$$\frac{dy}{dx}(x) - \frac{dx}{dx}(3y) = \frac{d}{dx}(0)$$

$$2 - \frac{3dy}{dx}$$

$$\frac{dy}{dx} = 2/3$$

3b) $x^2 + y^2 = 4$

$$\frac{d}{dx}(x^2) + \frac{d}{dx}(y^2) = 4$$

$$2x + 2y \cdot \frac{dy}{dx} = 0$$

$$2y\frac{dy}{dx} = -2x$$

$$\frac{dy}{dx} = \frac{-2x}{2y}$$

1) $y = \cos x$

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

Subtract y from both sides

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

But $y = \cos x$

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

Consider from Trig

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

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

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

Compare I and II

let $A + B = x + \delta x$ — 1

$A - B = x$ — 2

Adding I and II

$2A = 2x + \delta x$

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

$A = x + \delta x/2$

$B = \delta x/2$ } (iii)

Compare eqn (iii) and (ii)

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

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

Dividing through by δx

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

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

Take lim

$\lim_{\delta x \to 0} \frac{\delta y}{\delta x} = \frac{dy}{dx} = -\sin(x + 0) \cdot 1$

$\lim_{\delta x \to 0} \frac{\delta y}{\delta x} = \frac{dy}{dx} = -\sin x$

5) $f(x) = 2x^2 - 5$

$g(x) = 4x - 2$

$\log(x)$

$\log(x) = 2(4x-2)^2 - 5$

$= 2[(4x-2)(4x-2)] - 5$

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

$\log(x) = 32x^2 - 32x + 8 - 5$

$32x^2 - 32x + 3$

$\log = g(2x^2 - 5)$

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

$= 8x^2 - 20 - 2$

$= 8x^2 - 22$

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

$fx = f(x) + f(x)/2$

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

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

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

$= 6x^2 + 2/2$

$= 3x^2 + 1$

$f_o(x) = f(x) - f(-x)/2$

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

2

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

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

$= -2x$

$fx = f_o(x) + f_o(x)$

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

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