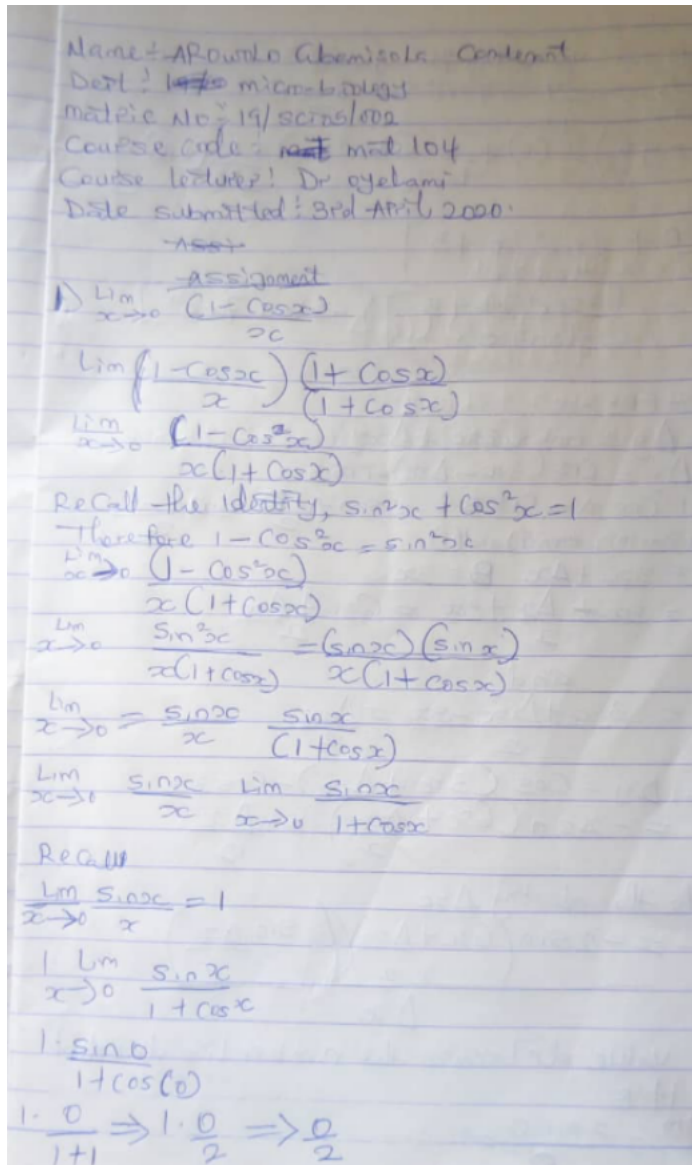


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2) $u = -3$ $v = -\tan 7x$ $w = e^{3x}$
 $\frac{du}{dx} = 0$ $\frac{dv}{dx} = 7\sec^2 7x$ $\frac{dw}{dx} = 3e^{3x}$

$$\frac{dy}{dx} = y^2 \left[\frac{1}{3} (0) + \frac{1}{-\tan 7x} (7\sec^2 7x) + \frac{1}{e^{3x}} (3e^3) \right]$$

$$y \left[0 + \frac{7\sec^2 7x + 3}{-\tan 7x} \right]$$

$$\frac{dy}{dx} = \left[\frac{7\sec^2 7x + 3}{-\tan 7x} \right] \left[-3 \tan 7x e^{3x} \right]$$

3) $y = \cos 3x$

$$y = \Delta y = \cos(3x + \Delta x)$$

$$\Delta y = \cos(3x + \Delta x) - \cos 3x$$

Recall $\cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$

Comparing eqn (i) and (ii)

$$A = 3x + \Delta x \quad B = 3x$$

$$\frac{A+B}{2} = \frac{3x + \Delta x + 3x}{2} = \frac{6x + \Delta x}{2}$$

and

$$\frac{A-B}{2} = \frac{3x + \Delta x - 3x}{2} = \frac{\Delta x}{2}$$

$$\text{Hence, } \Delta y = \cos(3x + \Delta x) - \cos 3x \\ = -2 \sin \left(\frac{6x + \Delta x}{2} \right) \sin \frac{\Delta x}{2}$$

Divide through by Δx

$$\frac{\Delta y}{\Delta x} = -2 \sin \left(\frac{6x + \Delta x}{2} \right) \left(\frac{\sin \frac{\Delta x}{2}}{\frac{\Delta x}{2}} \right)$$

this value determines the number li's divided by $\frac{1}{1+B}$

$$\lim_{\Delta x \rightarrow 0} \frac{\sin 0}{0} = 1$$

$$\frac{\Delta y}{\Delta x} = \frac{2 \sin\left(6x + \frac{\Delta x}{2}\right) \left(\frac{\sin \frac{\Delta x}{2}\right) \times \frac{1}{2}}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \frac{2 \times \frac{1}{2}}{2 \sin\left(6x + 0\right)} \lim_{\Delta x \rightarrow 0} \frac{\sin\left(\frac{\Delta x}{2}\right)}{\frac{\Delta x}{2}}$$

$$\sin 6x \lim_{\Delta x \rightarrow 0} \frac{\sin\left(\frac{\Delta x}{2}\right)}{\frac{\Delta x}{2}} = 1$$

$$\text{Hence } \frac{dy}{dx} = -2.5062$$

$$4) f(x) = 2x^2 - 7x \text{ and } g(x) = -3x$$

$$(f-g)(x) = 2(x) - 3(x)$$

$$(f-g)(x) = 2(2x^2 - 7x) - 3(-15)$$

$$(f-g)(x) = 2(2x^2 - 7x) - 3(-15)$$

$$(f-g)(x) = 2(50 - 35 + 15)$$

$$(f-g)(x) = 2(30)$$

$$5) f(x) = 4x^2 + 2, g(x) = 2x + 3$$

$$f \circ g(x) = 4(2x+3)^2 + 2$$

$$= 4(4x^2 + 6x + 9) + 2$$

$$= 4(4x^2 + 6x + 9) + 2$$

$$= 16x^2 + 48x + 36 + 2$$

$$= 16x^2 + 48x + 38$$

$$6) x^2 + 2xy + y^2 = 1000$$

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

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

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

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

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

$$7) y = x^2 \cos x$$

$$u = x^2 \quad y = \cos x$$

$$\frac{dy}{dx} = 2x \cos x$$

$$\frac{dy}{dx} = 2x \cos x$$

$$v = \cos x$$

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

$$\frac{dy}{dx} = \frac{v \frac{dv}{dx} + u \frac{du}{dx}}{dx}$$

$$= (x^2)(-\sin x) + (2x)(\cos x)$$

$$= -x^2 \sin x + 2x \cos x$$

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

$$= x(2 \cos x - x \sin x) \text{ or } (2x \cos x - x^2 \sin x)$$

$$= x(2 \cos x - x \sin x) \text{ or } (2x \cos x - x^2 \sin x)$$