YAGUBU HEEKMAT

17/ENG02/050

COMPUTER ENGINEERING

ASSIGNMENT 2

$F = x^2 i + (3x+2) j + \sin x k$

(a) $\frac{\partial F}{\partial x} = 2x i + 3j + \cos x k$

b $\frac{\partial^2 F}{\partial x^2} = 2i - \sin x k$

c $\left|\frac{\partial F}{\partial x}\right| = at\ x=1 \Rightarrow 2(1) i + 3j + \cos(1) k$

$= 2i + 3j + 0.999 k$

$= \sqrt{2^2 + 3^2 + 0.995^2}$

$= \sqrt{13.958}$

$= 3.74$

d $\frac{d}{dx}(F \cdot F)$

$(F \cdot F) = (x^2 i + (3x+2) j + \sin x k)^2$

$= (x^2 i + (3x+2) j + \sin x k) \cdot (x^2 i + (3x+2) j + \sin x k)$

$$\frac{d(\sin^2 x)}{dx} = \sin^2 x = \sin x - \sin x$$

$u = \sin x$, $v = \sin x$

$\frac{du}{dx} = \cos x$, $\frac{dv}{dx} = \cos x$

Product Rule

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

$$\sin x \cdot (\cos x) + \sin x (\cos x)$$

$$\sin x \cos x + \sin x \cos x$$

$$\sin 2x = 2 \sin x \cos x$$

$$\frac{d}{dx}(F.F) = 4x + 18x + 12 + 2\sin\cos x$$

at $x = 1$

$$= 4(1) + 18(1) + 12 + 2\sin(1)\cos(1)$$

$$= 34.03$$