Assignment 2 — SHAFHAN FRANCIS
17/ENG02/028 — COMPUTER ENGINEERING

1. $F = x^2\hat{i} + (3x+2)\hat{j} + \sin x\hat{k}$

a. $\frac{dF}{dx} = 2x\hat{i} + 3\hat{j} + \cos x\hat{k}$

b. $\frac{d^2F}{dx^2} = 2\hat{i} - \sin x\hat{k}$

c. $\left|\frac{dF}{dx}\right|$ at $1 = 2(1)\hat{i} + 3\hat{j} + \cos(1)\hat{k}$

$= 2\hat{i} + 3\hat{j} + 0.999\hat{k}$

$= \sqrt{2^2 + 3^2 + (0.999)^2}$

$= \sqrt{13.998}$

$= 3.74$

$\frac{d}{dx}(F.F) = (x^2\hat{i} + (3+2)\hat{j} + \sin x\hat{k}) - (x^2 + (3x+2$

$= x^4 + 9x^2 + 12x + 4 + \sin^2 x$

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

$du/dx = \cos x$   $dv/dx = \cos x$

Using Product rule

$U\, dv/dx + V\, du/dx$

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

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

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

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

at $x = 1$

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

$= 4 + 18 + 12 + 0.03484$

$= 34.03$