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MATRIC NO:	17/ENG04/065
DEPARTMENT:	ELECT/ELECT ENGR
COURSE:	ENGR. MATHEMATICS

ASSIGNMENT 2

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

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

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

c. $\left|\frac{dF}{dx}\right| = \sqrt{(2)^2 + (3)^2 + (1)^2}$; $2xi + 3j + \cos x\, k$ at $x = 1$

$= \sqrt{4+9+1}$

$= \sqrt{14}$

$= 3.74$

d. $\frac{d}{dx}(F.F)$ at $x = 1$

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

$\frac{d}{dx}(F.F) = x^4 i + (9x^2 + 12x + 4)j + (\sin^2 x)k$

$= 4x^3 + 18x + 12 + \sin(2x)$

$= 4 + 18 + 12 + 0.035$ at $x = 1$

$= 34.035$

$\frac{d}{dx}(F.F) = 34.04$

2. $r = (t^2 + 3t)i - 2\sin 3t\, j + 3e^{2t}$

$\frac{dr}{dt} = (2t+3)i - 6\cos 3t\, j + 6e^{2t} k$

$\frac{d^2r}{dt^2} = \frac{d}{dt}\left[\frac{dr}{dt}\right]$

$= \frac{d}{dt}\left[(2t+3)i + (-6\cos 3t)j + 6e^{2t} k\right]$

$\frac{d^2r}{dt^2} = 2i + (18\sin 3t)j + 12e^{2t} k$

$\left|\frac{d^2r}{dt^2}\right| = \sqrt{(2)^2 + (18\sin 3(0))^2 + (12e^{2(0)})^2}$

$= \sqrt{4+144}$

$= 2\sqrt{37}$

$= 12.17$