

ORP ALA CHRISTOPHER CHARLES
COMPUTER ENGINEERING

ENG-282

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

a $\frac{dF}{dx} = 4xi + 3j + \cos xk$

b $\frac{d^2F}{dx^2} = 2i - \sin xk$

c $\left| \frac{dF}{dx} \right| = \frac{\sqrt{2^2 + 3^2 + 1^2}}{\sqrt{13}} \quad a + bc = \left| \frac{dF}{dx} \right| = 2\sqrt{13}k$

$F \cdot f = [(x^2i + (3x+2)j + \sin xk) \cdot (xi + (3x+2)j + \sin xk)]$

$= x^4 + (3x+2)^2 + \sin^2 x \quad [i \cdot i = \hat{i} \cdot \hat{i} = k \cdot k = 1]$

$\frac{d(F \cdot f)}{dx} = 4x^3 + 2(3)(3x+2) + 2 \cos x$
 $= 4x^3 + 6(3x+2) + 2 \cos x$

2 $r = (t^2 + 3t)i - 2 \sin 3tj + 3e^{3t}k$

a $\frac{dr}{dt} = (2t+3)i - 6 \cos 3tj + 9e^{3t}k$

$$b \quad \frac{d^2 r}{dt^2} = 2r + 18r \sin 3t + 27e^{3t} k$$

c at $t=0$

$$\left. \frac{d^2 r}{dt^2} \right|_{t=0} = 2r + 0 + 27k$$

$$\left| \frac{d^2 b}{dt^2} \right| = \sqrt{2^2 + 27^2}$$
$$= 27.07$$