

CIVIL ENGR

M/ENAO3/038

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

$$\textcircled{1} \frac{dF}{dx} = 2xi + 3j + \cos x k$$

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

$$\left| \frac{dF}{dx} \right| = [2^2 + 3^2 + 1^2]^{\frac{1}{2}} = \underline{\underline{3.74}}$$

$$\frac{d(F \cdot F)}{dx} \textcircled{3} x=1$$

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

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

$$\frac{d(F \cdot F)}{dx} = 4x^3 + 18xt + 2 + \cos^2 x$$

$$\frac{d(F \cdot F)}{dx} \textcircled{4} x=1$$

$$4(1)^3 + 18(1) + 2 + \cos^2(1)$$

$$\frac{d(F \cdot F)}{dx} = \underline{\underline{22.99969541}}$$

$$\underline{\underline{23}}$$

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

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

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

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

$$= 12 \cdot 16552506$$

$$\underline{\underline{12 \cdot 17}}$$