

ADARSH KARKI ABIMBOLA

17/ENG001004

CIVIL ENGINEERING

ENR 282

General form

$$F = x^2 + (3x + 2y) + \sin \pi x$$

$\frac{dF}{dx}$

$\frac{dF}{dy}$

$$\frac{d^2 F}{dx^2} = 2x + (3 + \pi \cos \pi x)$$

$\frac{dF}{dx}$

$\frac{dF}{dy}$

Solution

$\frac{dF}{dx}$

$\frac{dF}{dy}$

$\frac{d^2 F}{dx^2}$

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$$c) \frac{df}{dx} = 2i + 6j + 0.996k$$

$$\sqrt{2^2 + 6^2 + (0.996)^2}$$

$$= \sqrt{3.996}$$

$$= 3.74$$

0) $\frac{d}{dk} (I.F.)$

$$= k^3 j + (8k + 2j) + \sin \pi k + [k^2 i + (8k + 2j) + \sin k + k^4 i + (9k^2 + 12k + 4) + \sin^2 k]$$

$$\frac{d}{dk} (I.F.) = 4k^3 + (16k + 12) + 2 \sin \pi \cos \pi k$$

at $k = 2$

$$4(2)^3 + (16(2) + 12) + 2 \sin(4) \cos(2)$$

$$= 4 + 30 + 0.035$$

$$= 34.035$$

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

Determine $\frac{dr}{dt}$

b) $\frac{d^2 r}{dt^2}$ and c) The value $\left. \frac{dr}{dt} \right|_{t=0}$

Solution

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

at $t = 0$

$$(3 \times 0 + 3)j - 2 \cos(0)j + 6e^{2 \times 0} k$$

$$= 3j + -6j + 6k^2$$

$$\frac{d^2 i}{dt^2} + 18 \sin 36t + 120^{2t} \text{ A}$$

$$i(t) = 0$$