Velocity (V) → $\frac{dx}{dt}$ أو $V = \int a(t)$ ← 1

Position (X) → $\int v(t) = x(t) + c$ ← 2

Acceleration → $\frac{dv}{dt} = \frac{dx^2}{dt^2} = \frac{dv}{dt} \cdot \frac{dx}{dt} = \frac{1}{2} \frac{dv^2}{dx}$ ← 3

Ex

- An electron moving along the x axis has a Position given by $x = 16te^{-t}$, where t is in seconds. How far electron from the origin when it momentarily stops?

Solution

$V = 0$, $\cancel{\quad} X = 0$

مشتقة x ← $V(t) = 16[e^{t} - te^{-t}]$

$\therefore t = 1$

$X(1) = \frac{16}{e}$ **

Q1

IF the Position of a Particle is given by $x = 3t^2 - t^3$, where x is in meters and t is seconds,
when if ever is the Particle's velocity zero?
b) when its Position at the acceleration become zero?
c) what the acceleration when the Particle's velocity is 3 m/s.

Solution

$V = 6t - 3t^2$ ← مشتقة x

$F = 6 - 6t \rightarrow t = 1$ ← 〃 v $\quad \therefore x(1) = 2$ ✱ b

$\frac{\cancel{6}t}{\cancel{3}} - \frac{\cancel{3}t^2}{\cancel{3}} = \frac{\cancel{3}}{\cancel{3}}$ ← بالقسمة على 3

$2t - t^2 - 1 = zero$

$(t - 1)^2 = zero$

$t = 1$ ✱ → c

ex;

-IF the relation between x and t is given by $x=e^{2t}-2e^{-2t}$, Prove that $v^2=4(x^2+8)$

, $F=4x$

Solution

* مشتقة ← $V=2e^{2t}+4e^{-2t}$

$V^2=4e^{4t}+16e^{-4t}+16$

$=4[e^{4t}+4e^{-4t}+4]$

$=4[e^{4t}+4e^{-4t}+8-4]$

$\because x^2=e^{4t}+4e^{-4t}+(-4)$

$V^2=4[x^2+8] \longrightarrow \#$

v مشتقة ← $F=[4e^{2t}-8e^{-2t}]$

$=4[e^{+2t}-2e^{-2t}]$

$\therefore F=4x \longrightarrow \#$