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Assignment.

E12-3

$v = 4t - 3t^2$

$s = \int v\,dt = \int 4t - 3t^2\,dt$

$s = \frac{4t^2}{2} - \frac{3t^3}{3} \Rightarrow 2t^2 - t^3 + c$

$s = 0,\ t = 0;$

$0 = 2(0)^2 - (0)^3 + c \quad ; \quad c = 0$

$s = 2t^2 - t^3$

when $t = 4$sec

$s = 2(4)^2 - (4)^3$

$s = -32$ m

32m to the left of the origin

E12-4

$v = (0.5t^3 - 8t)$

$a = \frac{d}{dt}(v) = \frac{d}{dt}(0.5t^3 - 8t)$

$a = 1.5t^3 - 8$

when $t = 2s$

$a = 1.5(2)^3 - 8$

$a = 4 m/s^2$

E12-7

$a = (4t^2 - 2) m/s^{-2}$

$v = \int a\,dt \quad = \int 4t^2 - 2\,dt$

$v = \frac{4t^3}{3} - 2t + C$

$s = \int v\,dt$

$= \int (\frac{4}{3}t^3 - 2t + C)\,dt$

$= \frac{4}{3\times4}t^4 - \frac{2t^2}{2} + Ct + A$

$s = \frac{1}{3}t^4 - t^2 + Ct + A$

when $t = 0, \quad s = -2m$.

$-2 = \frac{1}{3}(0)^4 - (0)^2 + C(0) + A$

$A = -2$

Hence $s = \frac{1}{3}t^4 - t^2 + Ct - 2$

when $t = 2, \quad s = -20$.

$-20 = \frac{1}{3}(2)^4 - (2)^2 + 2C - 2$

$-20 = \frac{-2}{3} + 2C \quad ; \quad C = \frac{-20 + 2\frac{2}{3}}{2}$

$C = -9\frac{1}{3}$

$s = \frac{1}{3}t^4 - t^2 - \frac{29}{3}t - 2$

when $t = 4$

$s = \frac{1}{3}(4)^4 - (4)^2 - \frac{29}{3}(4) - 2$

$s = 28.67$m

28.67m to the left of the origin.

F12-8

$$v = (20 - 0.05s^2)\ ms^{-1}$$

Recall that

$$a\,ds = v\,dv$$

$$a = v\frac{dv}{ds}.$$

$$\frac{dv}{ds} = -0.1s \quad @ \quad s = 15m$$

$$= -0.1 \times 15 = -1.5$$

$$v @ 15m = (20 - 0.05(15^2))$$

$$= 18.875 \quad 8.75$$

$$a = -1.5 \times \frac{8.75}{18.875}$$

$$= -13.125\ ms^{-2}.$$