Q. 7.

a) $\frac{x^2}{2} + y^2 = 8$

$y^2 = 8 - \frac{x^2}{2}$

$y = \sqrt{8 - \frac{x^2}{2}}$

$V = \pi \int_0^1 \left(\sqrt{8 - \frac{x^2}{2}}\right)^2 dx$

$= \pi \int_0^1 \left(8 - \frac{x^2}{2}\right) dx$

$= \left[8x - \frac{1}{6}x^3\right]_0^1$

$= \left[8(1) - \frac{1}{6}(1)^3\right] - \left[8(0) - \frac{1}{6}(0)^3\right]$

$= 8 - \frac{1}{6}$

$= 7\frac{5}{6} u^3.$

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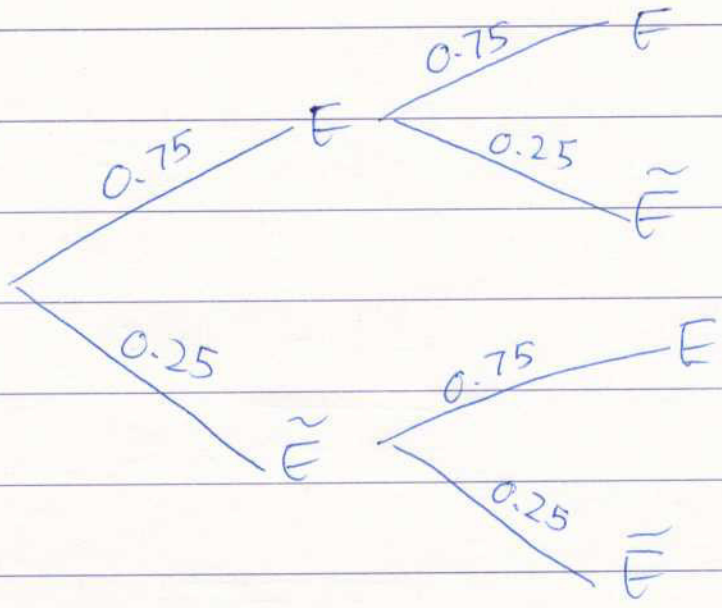
b)



i) $P = 0.25 \times 0.75$

$= 0.1875.$

ii) $P = 1 - (\tilde{E})^2$

$= 1 - (0.25)^2$

ii) $P = 0.25 \times 0.25$

$= 0.0625.$

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c) i) When $t=0$

$$x = \frac{0-2}{0+2}$$

$$= \frac{-2}{2}$$

$$= -1 \text{ m}$$

ii) $$\frac{dx}{dt} = \frac{(t+2) - 4(1)}{(t+2)^2}$$

$$= \frac{(t+2)-4}{(t+2)^2}$$

$$\therefore = \frac{t-2}{(t+2)^2}$$

$$\frac{d^2x}{dt^2} = \frac{(t+2)^2 \times 1 - (t-2) \times 2(t+2)}{(t+2)^4}$$

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

$$= \frac{(t+2) - 2(t-2)}{(t+2)^3}$$

$$= \frac{t+2-2t+4}{(t+2)^3}$$

$$= \frac{6-t}{(t+2)^3}$$

(ii) $\frac{(t+2)-2(t-2)}{(t+2)^3} = 0$

$(t+2)-2(t-2) = 0$

$(t+2) = 2t$

(ii) $\frac{6-t}{(t+)^3} = 0$

$6-t = 0$

$t = 6.$

yes the particle is at rest when $t=6$.

(iv)