Question 7.

a. $V = \pi \int_a^b y^2 dx$.

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

$= \pi \left[8x - \frac{1}{6}x^3\right]_0^2$

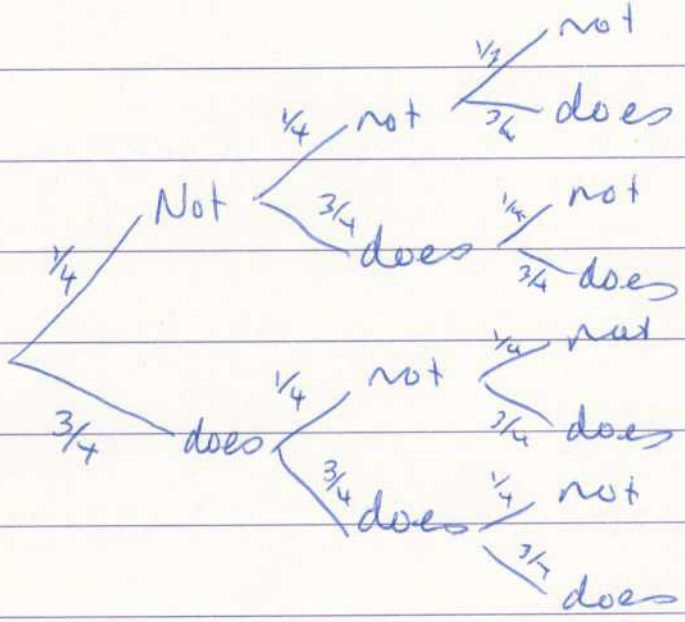
$= \pi\left(16 - 1\tfrac{1}{3}\right) - (0)$

$= \pi\left(14\tfrac{2}{3}\right)$

$= 46.076692255\ldots$

$= 46.08 \text{ units}^3$ (2 dec pl)

b)



i. P(first time or second) = 3/4

saying didn't get through first attempt = 3/16

ii P(not connected after 3) = 1/64

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c) $x = \frac{t-2}{t+2}$ t in sec.

i. $t=0$. $x = \frac{-2}{2}$

$\therefore x = -1$

displacement = 1 when $t=0$.

ii $x = 1 - \frac{4}{t+2}$.

hence velocity $= y' = \dot{a}$.

velocity =

$y = -4(t+2)^{-1}$

$y' = 4(t+2)^{-2} \cdot 1$

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

hence acceleration $= y'' = \ddot{a}$

acceleration =

$y' = 4(t+2)^{-2}$

$y'' = -8(t+2)^{-3} \cdot 1$

$= -\frac{8}{(t+2)^3}$

iii particle at rest when $V=0$.

$4(t+2)^{-2} = 0$.

$(t+2)^{-2} = 0$

$\frac{1}{(t+2)^2} = 0$.

$\frac{1}{t^2+4t+4} = 0$ ↕

$t^2+4t+4 = 0$.

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

$\therefore t = -2$

$t \geq 0$.

$\therefore$ The particle never rests. because $t \geq 0$.

iv. limiting velocity.

limit when $a = 0$.

$-\frac{8}{(t+3)^3} = 0$.

$-(t+3)^3 = 0$.

$-(t+3)(t^2-3t+9) = 0$. (t and d

$\therefore t = -3$.