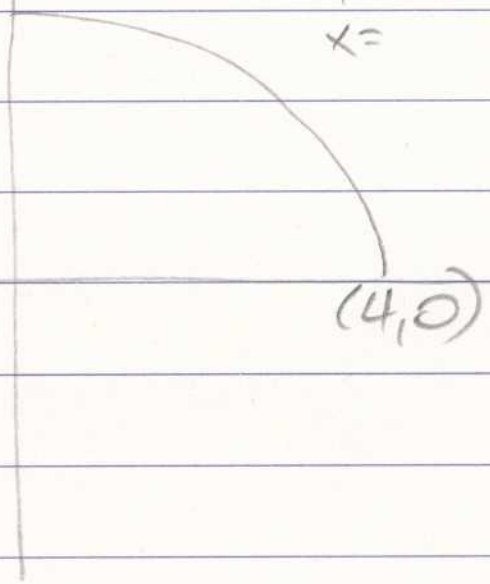
Question 7

Q7 a) $\frac{x^2}{2} + y^2 = 8$

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

when $y = 0$

$x =$



when $y = 0$

$8 - \frac{x^2}{2} = 0$

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

$x^2 = 16$

$x = \pm 4$

$= 4$

$\therefore V = \pi \int_a^b y^2 \, dx$

$V = \pi \int_0^4 8 - \frac{x^2}{2} \, dx$

$V = \frac{\pi}{2} \left[8x - \frac{x^3}{3} \right]_0^4$

$V = \frac{\pi}{2} \left[\left(32 - \frac{64}{3}\right) - (0) \right]$

$V = \frac{\pi}{2} \left(10\frac{2}{3}\right)$

$= \frac{\pi}{2} \left(\frac{32}{3}\right) = \frac{32\pi}{6} \text{ u}^3$

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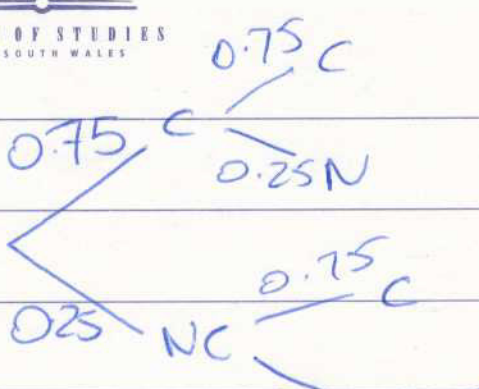
b)



P(connected)

i) 0.75×0.75

$= 0.5625$

P(not connected)

ii) $= 0.25 \times 0.25 \times 0.25$

$= 0.015625$

c) $x = \dfrac{t-2}{t+2}$

P(not connected)

i) when $t = 0$

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

$x = -1$

ii) $x = 1 - \dfrac{4}{t+2}$ ~~$\Rightarrow t+2 = t+2-4$~~

~~$x = t+2-4$~~

~~$x = t-2$~~

~~$\dfrac{t-2}{t+2} = 1 - \dfrac{4}{t+2}$~~

hence ~~$t-2 = t-2$~~

~~$t+2$~~

$x = -1$ when $t = 0$

PTO...

~~$-1 = 1 - \dfrac{4}{t+2}$~~ ~~$-1 = t+2-4$~~

~~$t = 1$~~

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~~$x = 1 - \frac{4 \to u}{t+2 \to v}$~~

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

$xt + 2x = t + 2 - 4$

~~$x = v = t+2$~~

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

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

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

$x = \frac{t-2 \to u}{t+2 \to v}$

$x = v = \frac{(t+2)\cdot 1 - (t-2)\cdot 1}{(t+2)^2}$

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

$\frac{-t+2}{(t+2)}$

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

$\dot{x} = v$

$v = \frac{-4 \to u}{-t-2 \to v}$

$\frac{-(t+2)\cdot 0 + 4(-1)}{-(t+2)^2}$

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

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

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$\ddot{x} = a$

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

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

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

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

iii) at rest when $V=0$

$\frac{4}{(t+2)^2} = 0$

$4 = 0$

no sol $\therefore$ never at rest.

iv)