Q8

a) $Q = Q_0 e^{-kt}$

when $t = 0$

$Q = Q_0 e^{-k \times 0}$

$Q = Q_0 e^0$

$Q = Q_0$

when $Q = 6$

$\therefore Q_0 = 6$

$Q = 6e^{-kt}$

$6 = 6e^{-kt}$

$1 = e^{-kt}$

$\ln 1 = -kt$

$t / \ln 1 = -k$

$\ln e^k = 0$

$e^0 = 1$

when $t = 15$ $Q = 3$

$3 = 6e^{-k15}$

$\frac{3}{6} = e^{-k15}$

$\frac{1}{2} = e^{-k15}$

$\ln \frac{1}{2} = -k15$

$15 \div \ln \frac{1}{2} = -k$

$k = 10.397\ldots 21.6464\ldots$

$k = 10.4$ 21.64 to 2DP

ii) $\frac{3}{4} = 6e^{-10.4t}$

$\frac{1}{4} = e^{-10.4t}$

$-10.4 \ln \frac{1}{4} = t$

$\frac{3}{4} = 6e^{-21.64t}$

$\frac{1}{4} = e^{-21.64t}$

$\ln \frac{1}{4} = -21.64t$

$-21.64 \div \ln \frac{1}{4} = t$

$t = 9.848\ldots$

$t = 9.8$

when t 9.8 hours has past $\frac{1}{8}$ of Dosage will remain.

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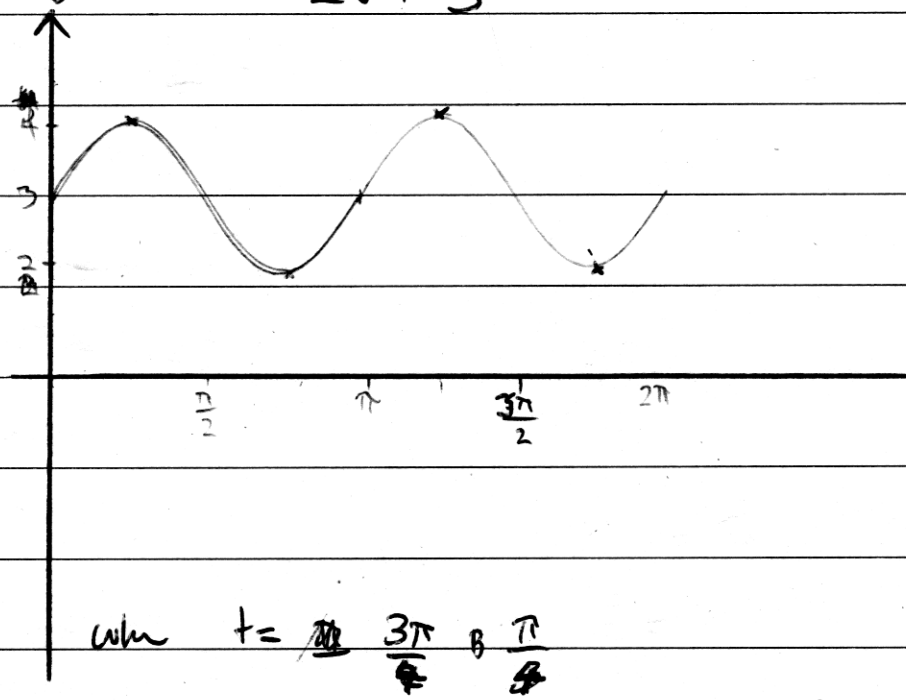
b) $x = \sin 2t + 3$



when $t = \frac{3\pi}{4}$ & $\frac{\pi}{4}$

the partical starts at a point then move to another one unit away return past the first point to next another new point 2 units away. at each point except the first the particle rests for a moment.