Qn.2

$Q = 238\,(0.8)^{t/4}$

a) Initial dose is Q when $t = 0$

$Q = 238\,(0.8)^{0/4} = 238 \times 0.8^{0}$

$= 238$ mg

b) $Q = 238\,(0.8)^{8/4} = 0.8^{2}\,(238)$

% decrease $= \dfrac{238(0.8) - 238(0.8)^{2}}{238(0.8)}$

$= \dfrac{0.1 - 0.64}{0.81} \times 100$

$= 36\% = 36\%$

c) $Q = 238\,(0.8^{1/2})$

% decrease $= \dfrac{238(0.8) - 0.8^{1/2}}{238\,(0.8)} \times 100$

$1 - 0.894 = 10.56\%$

d) $\frac{\Delta Q}{\Delta t}$ from $t=2$ $t = 2+\frac{1}{6} = \frac{13}{6}$

Q when $t = \frac{13}{6}$

$$Q = 238\left(0.8^{\frac{13}{6}\times 4}\right) = 238(0.8861)$$

Q when $t = 2$

$$Q = 238(0.8)^{\frac{1}{2}} = 238(0.8944)$$

$$\frac{\Delta Q}{\Delta t} = \frac{238(0.8861 - 238(0.8944)}{\frac{1}{6}}$$

$$= \frac{238(-0.0083)}{\frac{1}{6}} = -11.8524$$

e) It is a good estimate because the change is decreasing. Confidence would have increased by using a narrower

interval say 1/2 ✓

(f) $Q'(2)$

$$Q'(t) = \frac{-119 \ln 5 - \ln 4 \cdot 4^{t/4}}{2.5^{t/4}}$$

$$Q'(2) = \frac{-119 \ln 5 - \ln (4) \cdot 4^{1/2}}{2.5^{2/4}}$$

$$Q'(2) = 119.0941$$

(g) 10% of initial medication

$$\frac{10}{100} \times 238 = 23.8$$

$$23.8 = 238 (0.8)^{t/4}$$

$$0.1 = 0.8^{t/4}$$

$$\log 0.1 = t/4 \log 0.8$$

$$t/4 = \frac{\log 0.1}{\log 0.8} = 10.32$$

$10.32 = t/4$

$t = 41.28$ hours later.