b) I used to set out for work at seven o'clock, around the time that the postman arrived. Sometimes he arrived before I set out, sometimes not. In summer (for example) there should be no greater tendency for him to overstep on any day than on any other (though there may be a difference between winter & summer), so whether the post arrives before seven o'clock could be treated as a Bernoulli process, with $p \approx 1/3$. ✓ 3/3

c) i) the mean number of events in 24 hours is simply $10/7 = 1.429$

ii) $P(X \leq 1) = P(0) + P(1)$

$= \frac{e^{-1.429}}{0!} + \frac{e^{-1.429} \times 1.429^1}{1!}$

$= 0.2395 + 0.3423$ ✓

$= 0.5818$ 3/3

d) $\mu = 365 \times 1.429 = 521.6$

Variance $= 521.6 (= \mu)$

$P(X > 600) = 1 - P(X \leq 600) = 1 - \Phi\left(\frac{600.5 - 521.6}{\sqrt{521.6}}\right)$ 4/4

$P(X > 600) = 1 - 0.9997 = 0.0003$

e) Solve $z = \frac{X - \mu}{\sigma}$ (assuming a continuous distribution)

the 95% point is given for $N(0,1)$ by $1.645 (= z)$

$1.645 = \frac{X - 1000}{\sqrt{230}}$

$X = 1.645 \times \sqrt{230} + 1000$

$= 1024.95$

$= 1025$ ✓ (to four sig figs) 3/3

f) The maximum likelihood estimator X_{max} is biased for θ, ∞ is the moment estimator $2\bar{X}$. X The moment estimator can give a result which is less than the max value

2/4