Section 3.5

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(a) $X+Y \sim Poisson(2)$, so $P(X+Y=4) = \frac{e^{-2}2^4}{4!}$.

(b) $E[(X+Y)^2] = [E(X+Y)]^2 + Var(X+Y) = 6$.

(c) $X+Y+Z \sim Poisson(3)$, so $P(X+Y+Z=4) = \frac{e^{-3}3^4}{4!}$.

12 $X+Y \sim Poisson(9.28)$, so we have

$$\begin{aligned} P(X+Y \leq 4) &= \sum_{k=0}^{4} \frac{e^{-9.28} 9.28^k}{k!} \\ &= e^{-9.28}(1 + 9.28 + \frac{9.28^2}{2} + \frac{9.28^3}{6} + \frac{9.28^4}{24}) \\ &= 0.04622 \end{aligned}$$

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(a)$P($ no mistakes on each page $) = e^{-0.01} = 0.99$. Let X denote the number of pages with no mistakes, then $X \sim Bin(200, 0.99)$. $EX = 200 * 0.99 = 198$, and $VarX = 200 * 0.99 * 0.01 = 1.98$.

(b)$\lambda' = 0.01 * 0.9 = 0.009$, $P($ no mistakes read by the person on each page $) = e^{-0.009} = 0.991$. The probability for this person to find some mistakes on each page is $1 - 0.99104 = 0.00896$. Let X' be the number of pages where this person will find some mistakes, then $X' \sim Bin(200, 0.00896)$. $EX' = 200 * 0.00896 = 1.792$.

(c)Let Y be the number of pages with mistakes, then $Y \sim Bin(200, 1 - e^{-0.01})$.

$$\begin{aligned} P(Y \geq 2) &= 1 - P(Y \leq 1) \\ &= 1 - \binom{200}{0}(1-e^{-0.01})^0(e^{-0.01})^{200} - \binom{200}{1}(1-e^{-0.01})(e^{-0.01})^{199} \\ &= 0.592 \end{aligned}$$