POISSON KING

5.7 # 253 (1, 3, 5)

1. X = Poisson with mean $\lambda = 4$ find

(a) $\{x=1\} = \frac{e^{-\lambda}\lambda^i}{i!}$

more accurate $= \frac{e^{-4}(4)^1}{1!} = \frac{0.0183(4)}{(1)}$

,018315638 9

$\times 4 = ,0732625556$ $= ,0732$ ✓

(b) $\{x=2\} = \frac{e^{-4}(4)^2}{2!} = \frac{0.0183(16)^8}{2}$

more accurate

,018315638 9 $= ,1464$ ✓

$\times 8 = ,1465251111$

(c) $\{x>2\}$ same as

$1 - P\{x=2\} + P\{x=1\} + P\{x=0\}$

$\{x=0\} = \frac{e^{-4}(4)^0}{0!} = ,0183$

ADD THEM UP

~~,018315638 9~~

,0732625556

,1465251111

,018315638 9

,2381063306

$1-(\downarrow) = ,7618936$

,0732

,1464

,0183

,2379

$1-(\downarrow)$

$= ,7621$

#3. Lottery ticket 500 Lotteries

$p = 1/1000$

$n = 500$ INDEPENDENT EVENTS

$P\{X=0\}$

$$\binom{500}{0} \frac{500!}{0!\,500!} \left(\frac{1}{1000}\right)^0 \left(\frac{999}{1000}\right)^{500}$$

$$(1)(1)(.999)^{500}$$

$$= .6063789449$$

$P\{X=1\}$

$$\binom{500}{1} \frac{500!}{1!\,499!} \left(\frac{1}{1000}\right)^1 \left(\frac{999}{1000}\right)^{499}$$

$$\frac{500 \cdot 499!}{1!\,499!} \left(\frac{1}{1000}\right)(.999)^{499}$$

$$= 500\,(.001)(.6069859308)$$

$$= .3034929654$$

$P\{X=2\}$

$$\binom{500}{2} \frac{500!}{2!\,498!} (.001)^2 (.999)^{498}$$

$$\frac{500 \cdot 499 \cdot 498!}{2 \cdot 1 \cdot 498!} (.001)^2 (.6075935243)$$

$$= .07579729222$$

5. 4 CLAIMS PER MONTH

$\text{MEAN} = 4$

NOTE: SAME AS PROBLEM #1

(a) $P\{X=0\}$

(b) $P\{X \le 2\} = P\{X=0\} + P\{X=1\} + P\{X=2\}$

(c) $P\{X=4\}$

(a) $P\{X=0\} = \dfrac{e^{-4}(4)^0}{0!}$

$= \dfrac{.0183(1)}{(1)} = .0183$

(b) $P\{X \le 2\} = P\{X=0\} + P\{X=1\} + P\{X=2\}$

$P(X=1) = \dfrac{e^{-4}(4)^1}{(1)} = \dfrac{.0183(4)}{(1)} = .0732$

$P(X=2) = \dfrac{e^{-4}(4)^2}{2!} = \dfrac{.0183(16)}{2} = .1464$

ADD UP $.0183 + .0732 + .1464 = .2379$

(c) $P\{X=4\}$ $\dfrac{e^{-4}(4)^4}{4!} = \dfrac{.0183(256)}{4 \cdot 3 \cdot 2 \cdot 1 (24)} =$

$= \dfrac{.0183(256)}{24}$

$= \dfrac{4.6848}{24} = .1952$