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CIS 2033
Homework 8
4/3/15

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Chapter 12 Homework

1. $P(X=0) = 0.00001 = \frac{\mu^0}{0!} e^{-\mu}$

$= \frac{1}{1} e^{-\mu}$

$0.00001 = e^{-\mu}$

$\ln(0.00001) = -\mu$

$\mu = -\ln(0.00001) = 11.513$

$E[X] = \mu = \boxed{11.513}$

2. Pois(2) $\quad P(X \le 1) = P(X=0) + P(X=1)$

$P(X=0) = \frac{2^0}{0!} e^{-2} = \frac{1}{1} e^{-2} = e^{-2}$

$P(X=1) = \frac{2^1}{1!} e^{-2} = \frac{2}{1} e^{-2} = 2e^{-2}$

$P(X \le 1) = e^{-2} + 2e^{-2}$

$= 3e^{-2}$

$= \boxed{0.406}$

3. 11.5 cars arrive in 20 minutes

1) $\frac{11.5 \text{ cars}}{20 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{23}{40} \cdot \frac{1}{60} = \boxed{\frac{23}{2400} \text{ cars/sec.}}$

2) $\frac{23}{2400} \text{ cars/sec} \cdot 20 \text{ sec} = \boxed{\frac{23}{120} \text{ cars}}$

3) $\lambda = \frac{23}{2400} \text{ cars/sec.} \qquad \boxed{1/\lambda = \frac{2400}{23} \text{ sec/car}}$

4) $\mu = \lambda t = \frac{23}{2400} \text{ cars/sec} \cdot 10 \text{ sec} = \frac{23}{240} \text{ cars}$

$P(X=0) = \frac{\left(\frac{23}{240}\right)^0}{0!} e^{-23/240} = \frac{1}{1} e^{-23/240} = \boxed{\frac{1}{e^{23/240}} = 0.909}$

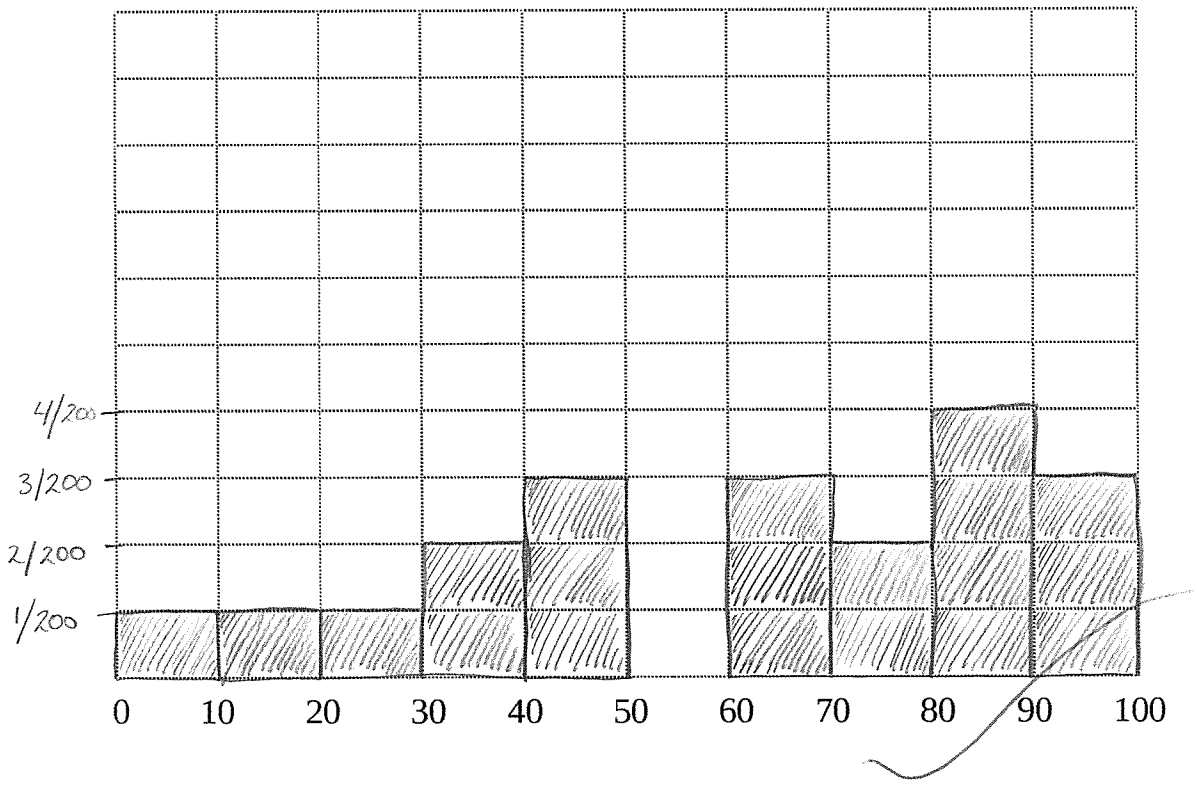
5) $P(x<2) = P(x=0) + P(x=1)$

$$P(x=1) = \frac{\left(\frac{23}{240}\right)^1}{1!} e^{-23/240} = \left(\frac{23}{240}\right)\frac{1}{e^{23/240}} = \frac{23}{240 \cdot e^{23/240}} = 0.087$$

$$\boxed{P(x<2) = \frac{1}{e^{23/240}} + \frac{23}{240 \cdot e^{23/240}} = 0.996}$$

Question 3.(1) According to the definition in the textbook, draw a histogram for the following numbers in [0, 100), using the given grid (i.e., letting the width of bins be 10). Mark the height of the bins in the histogram according to the textbook definition of histogram.

79.3, 44.2, 36.4, 65.2, 37, 62.4, 12.7, 43.8, 96.8, 83.1,
94.7, 26.7, 80.7, 86.7, 71.4, 2.5, 87.8, 65, 41.7, 94.3



height = $\frac{x}{20 \cdot 10} = \frac{x}{200}$