Quiz 5   STAT 381, Applied Statistical Methods I, Spring 2015

Name:

Problem 1. (5 points) At a certain location on the highway the number of speeding cars follows a Poisson distribution with an average of 12 cars per hour. If a cop sits and waits for 10 minutes monitoring cars, what is the probability that there will be no speeders?

$$12/hr = .2/min$$

$$X = \# \text{ in } 10 \text{ minutes} \quad X \sim Poisson(\underset{\underset{2}{\uparrow}}{.2} \cdot 10)$$

$$P(X=0) = poissonpdf(2,0)$$

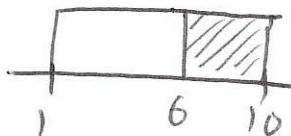$$= \frac{e^{-2} \cdot 2^0}{0!} = e^{-2} = .1353$$

Problem 2. (5 points) A child's attention span for any activity follows a continuous uniform distribution from exactly 1 to 10 minutes. You start reading her a story which will take 6 minutes to finish. What is the probability that she will sit for the whole story?

$$X = \text{attention span}$$

$$X \sim Unif_c(1,10)$$

$$f(x) = \begin{cases} \frac{1}{9} & x \in [1,10] \\ 0 & \text{otherwise} \end{cases}$$

$$P(X \geq 6) = \frac{10-6}{9} = \frac{4}{9}$$

Bonus (3 points) A manufacturing company makes mason jars. The height X follows $Unif_C(20, 22)$ cm. If the weight of a jar is $\frac{1}{10}X^3$ grams, what is the average weight?

$$E\left(\frac{1}{10}X^3\right) = \int_{20}^{22} \frac{x^3}{20} \, dx = \frac{x^4}{4 \cdot 20}\Big|_{20}^{22}$$

$$f(x) = \frac{1}{2} \quad x \in [20,22]$$

$$= \frac{22^4 - 20^4}{800} = 928.2 \text{ grams}$$