STAT/MA 41600

Practice Problems: December 3, 2014

1a. The average amount of time that a student spends studying for a final exam is 5 hours. Find an upper-bound on the probability that a student spends 7 or more hours studying for a final exam.

1b. Now also assume that the standard deviation of the study time for a final exam is 1.25 hours. Find a lower-bound on the probability that the time spent studying is between 3 to 7 hours.

2. Henry caught a cold recently and therefore he has been sneezing a lot. His expected waiting time between sneezes is 35 seconds. The standard deviation of the waiting time between his sneezes is 1.5 seconds. Find a bound on the probability that the time between two consecutive sneezes is between 30 and 40 seconds.

3. In a study on eating habits, a particular participant averages 750 cm^3 of food per meal.

a. It is extraordinarily rare for this participant to eat more than 1000 cm^3 of food at once. Find a bound on the probability of such an event.

b. If the standard deviation of a meal size is 100 cm^3, the find a bound on the event that the meal is either too much food, i.e., more than 1000 cm^3, or an insufficient amount of food, namely, less than 500 cm^3.

4. **(Review)** People shopping at the grocery store are interviewed to see whether or not they enjoy artichokes. Only 11% of people like artichokes.

a. How many people does the interviewer expect to meet until finding the 25th person who likes artichokes?

b. What is the variance of the number of people he meets, to find this 25th person who likes artichokes?

5. (Review) On a Monday evening, a student begins to wait for the telephone to ring. Let X_1 be the time until the telephone rings the first time. The student then picks up the phone, immediately recognizes he does not want to talk to the person, hangs up the phone, and begins to wait again for the second call. Let X_2 denote the waiting time after the first call, until the phone rings a second time. Assume X_1, X_2 are independent exponential random variables, each with mean 10 (minutes). Let $Y = X_1 + X_2$ be the total waiting time.

a. What kind of random variable is Y?

b. Find the expected value of Y.

c. Find the variance of Y.

d. Find the probability that Y exceeds 12 minutes, i.e., find $P(Y > 12)$.