STA 247 - Assignment #2

Name: ____________________ Student #: ________________

Due: October 28, 2016 @ 3:05PM - Submit through Crowdmark on Blackboard

October 18, 2016

Problem 1 [9 marks]. The number of stress-free students that show up in Bahen can be modeled with a Poisson random variable. On average, 4 stress-free students will show up on any given day.

a) What is the probability that while studying in Bahen that you'll spot more than 4 stress-free students?

b) What is the probability that over the next 7 days, only three days will have exactly 5 stress-free students showing up in Bahen? *Hint: Start with finding the probability that there are exactly 5 stress-free students on any given day.*

Problem 2 [6 marks]. A binomial random variable Y has $\mu = 5.4$ and $\sigma^2 = 2.97$.

a) Find $P(Y = 8)$.

b) Find $P(Y \geq 9 | Y \geq 2)$.

Problem 3 [7 marks]. You arrive at a bus stop at 8:30 AM to get to school. You have reasons to believe that the bus will arrive at a time that is uniformly distributed between 8:30 AM and 8:50 AM. By 8:37 AM, you're still waiting for the bus. What is the probability that you will have to wait at least another 5 minutes for the bus?

Problem 4 [9 marks]. A multiple-choice test consists of 20 items, each with four choices. For each question, the student can always ignore one of the choices because they know it is incorrect. For the remaining three choices, the student will randomly select one to be her answer. In order to pass this test, the student must get 12 or more questions correct.

a) What is the probability that the student passes?

b) If instead, the student can eliminate two of the choices for each question, what is her probability of passing now?

Problem 5 [12 marks]. A continuous random variable T has probability density function:

$$f(t) = \begin{cases} \dfrac{1 + \alpha t}{2}, & -1 \leq t \leq 1 \\ 0, & otherwise \end{cases}$$

where $-1 \leq \alpha \leq 1$.

a) Show that f is a density.

b) Find the corresponding cumulative distribution function.

c) Find the median of the distribution in terms of α.

Problem 6 [15 marks]. The lifetime (in years) of an electric component follows an exponential distribution with $\lambda = 0.2$.

a) Find the probability that the lifetime is less than 10 years.

b) Find the probability that the lifetime is between 5 and 15 years.

c) Find t such that the probability that the lifetime is greater than t is 0.01. What percentile would this be?

Problem 7 [10 marks]. The number of phone calls that an office receives can be modeled as a Poisson process with $\lambda = 2$ per 15 minutes.

a) If the secretary steps out to grab coffee for 10 minutes, what is the probability the phone rings during the time he is gone?

b) How long can the secretary be gone for if he wants the probability of receiving no phone calls during that time to be less than 0.5?