CE 311S: Exam 1

Friday, February 21

9:00 – 9:50 AM

Name _____

Instructions:

- **SHOW ALL WORK** unless instructed otherwise. No shown work means no partial credit!
- If you require additional space, you may use the back of each sheet and/or staple additional pages to the end of the exam.
- If you need to make any additional assumptions, state them clearly.
- You may use a calculator and one regular-sized sheet of notes. No additional resources are permitted.
- The number of points associated with each part of each problem is indicated.

Problem	Points	Possible
1		30
2		40
3		30
TOTAL		100

Problem 1. (30 points). During spring break you plan to go camping in the Hill Country with two of your best friends (Morgan and Noel). Unfortunately, Robin (one of Morgan's shady high school acquaintances) wants to come along. Robin is the sneaky type and always puts their phone away quickly when you come into the room. As a dedicated engineering student, you have kept detailed logs of all of your activities with these friends. Overall, you enjoy 70% of your activities with friends. Of the activities you enjoyed, Robin was there only 10% of the time; of the activities you did not enjoy, Robin was there 40% of the time.

(a) (10) Out of all the activities you have tracked, what percentage of them was Robin there for?

(b) (10) Out of the next 50 activities with your friends, how many do you expect to involve Robin and still be enjoyable?

(c) (10) If Robin comes along on the camping trip, what is the probability that you will enjoy it?

Problem 2. (40 points). Answer each of the following questions.

(a) (10) Camping is popular during spring break, and on average a group of people arrives at the campsite every 30 minutes. If it takes you three hours to drive from Austin, give the mean and standard deviation of the number of groups arriving at the campsite while you are driving.

(b) (10) Unfortunately, many campers do not read the rules and leave food and trash unsecured. There are 20 tents in the campground, and 5 of them have food stored inside. A bear comes to the camp and prowls through 4 tents. What is the probability that exactly 2 of these tents have food? For this part of the problem, assume that the bear searches through tents randomly (without any preference for the tents with food), and does not revisit the same tent twice.

(c) (10) Repeat part (b) if the bear has a poor memory and can't remember which tents it's already visited.[1]

(d) (10) Continue with the same assumptions as part (c), except now the bear will keep prowling through tents until it has found 2 with food in them; as soon as that happens the bear will be full and leave the campground. Give the mean and standard deviation of the number of tents the bear visits before leaving.

[1] I do not know how good a bear's memory is.

Problem 3. (30 points). After the bear leaves the campground, you, Morgan, and Noel notice that Robin has gone missing. You come up with 3 possibilities: "Robin got lost hiking", "Robin was eaten by the bear", "Robin snuck away for a secret rendezvous" (Morgan saw Robin furtively texting shortly before). The three of you will divide up and investigate these three possibilities, so you write down the three assignments on pieces of paper and randomly pass them out. Morgan immediately refuses their assignment and insists that you redo the selection, so you grudgingly reshuffle and pass them out a second time, insisting that these are the final assignments.

(a) (5) What is the probability that all of you end up with the same assignments as the first time?

(b) (5) What is the probability that nobody ends up with the same assignment they had the first time?

(c) (10) Among the three of you, on average how many people got the same assignment the second time?

(d) (10) What is the standard deviation of the number of people who got their original assignment?

What actually happened to Robin? Stay tuned for a future examination to find out...