

CE 311S: Exam 2

Friday, March 24

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. Please turn in this sheet with your exam.
- The number of points associated with each part of each problem is indicated.

Problem	Points	Possible
1		40
2		30
3		30
TOTAL		100

Problem 1. (40 points). You learn that Diego, one of the TAs for the class, is also a nationally competitive tennis player.¹ You hope to learn from him in order to improve your own game, and start by watching footage from his last tournament. You notice that the speed of his serve is always between 130 and 160 feet per second, and can be represented by the PDF kx^2 in this range.

- (a) (10) What is the value of k ?
- (b) (10) What is the mean speed of his serve?
- (c) (10) What is the variance in the speed of his serve?
- (d) (10) A regulation tennis court is 78 feet long. What is the mean time needed for his serve to cover this distance?

¹This is true.

Problem 2. (30 points). You start taking lessons, both from Diego and from your shady brother-in-law (who is not as good, but offers lessons at a cheaper price). Because you are busy this semester, you aren't very regular about taking lessons. The following chart shows the joint PMF for the number of lessons you take from them.

		Lessons from Diego (X)		
		1	2	3
Lessons from brother-in-law (Y)	1	1/8	1/4	1/8
	2	1/8	1/4	1/8

- (a) (5) What is the probability that you take more lessons from Diego than from your brother-in-law?
- (b) (10) What is the expected *total* number of lessons you will take?
- (c) (15) What is ρ_{XY} ?

Problem 3. (30 points). This summer, you participate in two tournaments with cash prizes. In the first tournament, the mean and standard deviation of the amount you will win are \$100 and \$50, respectively; for the second tournament these numbers are \$200 and \$120. Let S represent the sum of your winnings from the two tournaments.

- (a) (10) What are the mean and standard deviation of S , assuming that the amount you win in each tournament is independent?
- (b) (10) Assuming that S has a normal distribution, what is the probability that the sum of your winnings is more than \$430?
- (c) (10) Repeat part (a), but instead assume that the correlation coefficient of your winnings in the two tournaments is $+1/3$.