

Math 325_01

Name:_____

September 21, 2018

5 questions for 75 points possible

1. No hats or dark sunglasses. All hats are to be removed.
2. All book bags are to be closed and placed in a way that makes them inaccessible. Do not reach into your bag for anything during the exam. If you need extra pencils, pull them out now.
3. Use of the battery or solarpowered Texas Instruments BA35 model calculator, the BA II Plus, the BA II Plus Professional, the TI30Xa or TI30X II (IIS solar or IIB battery), or TI-30X MultiView (XS Solar or XB Battery) allowed.
4. No cell phones or music devices. Turn them off now. If you are seen with a cell phone in hand during the exam, it will be construed as cheating and you will be asked to leave. This includes using it as a time-piece.
5. If you have a question, raise your hand and I will come to you. Once you stand up, you are done with the exam. If you have to use the facilities, do so now. You will not be permitted to leave the room and return during the exam.
6. Every exam is worth a total of **75 points**. Check to see that you have all of the pages. Including the cover sheet, each exam has 6 pages.
7. Be sure to print your proper name clearly.
8. If you finish early, quietly and respectfully get up and hand in your exam.
9. When time is up, you will be instructed to put down your writing utensil, close the exam and remain seated. Anyone seen continuing to write after this announcement will have their exam marked and lose all points on the page they are writing on. I will come and collect the exams from you.
10. You have fifty minutes to complete the exam. Good luck.

1. [10 points] Suppose A and B are events with $P(A) = 0.32$, $P(B) = 0.48$, and $P(A \cap B) = 0.11$.

(a) Find $P(A \cup B)$.

(b) Find $P(B|\bar{A})$.

(c) Are the event A and B independent? Briefly explain.

2. [10 points] Let Y have the probability distribution function

$$p(y) = \begin{cases} 1/8, & y = 0, 2 \\ 3/8, & y = 1, 3 \end{cases}$$

(a) Find the mean for the distribution.

(b) Find the standard deviation for the distribution.

3. [20 points] A new surgical procedure is successful with a probability of $p = 0.8$. In a new trial, the operation is performed five times.

(a) Define the probability distribution for successful procedures.

(b) What is the probability that exactly four of the operations are successful?

(c) What is the probability that at least four of the operations are successful?

(d) Now, in another part of the world, Dr. Frankenstein learns of the new procedure. He decides he is going to perform this surgery until he gets it right once. What is the probability that Dr. Frankenstein gets his first success on the third operation.

4. [15 points] A group of eight candidates for three local teaching positions consisted of five who had enrolled in paid internships and three who enrolled in traditional student teaching programs. All eight candidates appear to be equally qualified, so three are randomly selected to fill the open positions. Let Y be the number of internship trained candidates who are hired.

(a) What type of distribution does Y follow and why?

(b) Find the probability that two or more internship trained candidates are hired.

(c) What is the mean and variance of Y ?

5. [20 points] Suppose that 30% of the applicants for a certain industrial job possess advanced training in computer programming. Unbeknownst to the applicants, the boss will be hiring the first candidate he interviews who has advanced training. Let Y be the number of candidates interviewed until the boss finds a successful candidate.
- (a) Determine the appropriate probability distribution you would use to determine how many interviews are required until a successful candidate is found.
 - (b) Find the probability that the first applicant with advanced training in programming is found on the fifth interview.
 - (c) What is the expected number of interviews required until a hire is made?
 - (d) Justify that the distribution in (a) is a proper probability distribution.