

STAT 225 - SUMMER 2011 - EXAM 1

NAME:

INSTRUCTOR:

CLASS TIME (CIRCLE ONE):

8:40-9:40am 9:50-10:50am 11:00am-12:00pm 1:00-2:00pm

- Show work for full credit. Unsupported work will NOT receive full credit.
- All answers should be in decimal form: no fractions, permutations, combinations, or exponential forms. Round all answers to at least 2 decimal places.
- You are responsible for upholding the Honor Code of Purdue University. This includes protecting your work from other students.
- You are allowed pages 8.5"x11" handwritten cheat sheets and a scientific calculator.
- Instructors will not interpret questions, tell you if you're on the right track, or check any answers for you. Only legitimate questions will be answered.
- You must turn in your Cheat Sheet at the end of the exam and may be asked to show your student ID.
- Turn off your cell phone before the exam begins.

Question	Points Possible	Points Received
1	12	
2	15	
3	12	
4	12	
5	13	
6	12	
7	12	
8	11	
Cheat Sheet	1	
Total	100	

1

Jared's family has purchased a LOT of beer to be enjoyed over the 4th of July holiday weekend. They bought a 12 pack each of Goose Island's 312 and Bells' Oberon, two 12 packs each of Corona and Blue Moon, and two 24 packs of Bud Light Lime all in coolers and completely covered by ice. For each of the following scenarios, state the distribution and parameter(s). If an approximation is appropriate, state the exact and approximate distributions for full credit. (3 points each)

1.1

Jared goes up to get the first round of beer for family and friends. He randomly grab 4 beers. Let C represent the number of Corona that he grabbed.

1.2

The bathroom is occupied by someone 20% of the time. Let T represent the number of the bathroom trips until Jared is able to use the bathroom for the first time.

1.3

Jared usually drinks 2 beers an hour. Let D represent the number of beers Jared drinks in the first three hours of his vacation.

1.4

Jared plays Euchre with his brother as his partner against their parents for an entire day. In the past Jared wins 60% of the time while partnered with his brother. Jared and his brother are going to play 7 games against their parents. Let W represent the number of times Jared and his brother win at Euchre.

2

Hans and Franz are here to pump! [clap, clap] You up! However, with all their lifting their muscles have finally started to twitch involuntarily. Typically, Hans will have a muscle twitch every 3 minutes and Franz will have a muscle twitch every 2 minutes. Let T represent the total number of muscle twitches that Hans and Franz have in an hour together. (15 points)

2.1

Either construct the Probability Mass Function (PMF) or determine the distribution and its parameter(s) that define T . (3 points)

2.2

5 muscle twitches just occurred in the last minute. What are the chances Franz had 3 muscle twitches in the last minute? (4 points)

2.3

What are the chances that precisely 1 muscle twitch will occur in a minute in any 3 of the next 10 minutes? (4 points)

2.4

Scientists begin monitoring the duo's muscle twitches at 1:00pm. What are the chances the first time neither Hans nor Franz have a muscle twitch occurs in the 1:07-1:08 minute? (4 points)

3

Greg has played both tennis and soccer for a long time. However, at his current age he is liable to injure himself in either sport. If he plays soccer he has a 2% chance of injuring a knee and will not injure anything else. If he plays tennis he has a 1% chance of injuring a shoulder and will not injure anything else. He decided to flip a fair coin to decide which he would play today. (12 points)

3.1

What are the chances Greg does not obtain an injury today and played tennis? (2 points)

3.2

What are the chances Greg does not obtain an injury today? (3 points)

3.3

Greg did obtain an injury today. What are the chances Greg played soccer? (4 points)

3.4

What are the chances Greg obtained an injury today or played tennis? (3 points)

4

Utilize the information from the previous problem and additionally note that it costs Greg \$500 every time he injures his knee and \$200 every time he injures his shoulder. (12 points)

4.1

Either construct the Probability Mass Function (PMF) or determine the distribution and its parameter(s) that describe the \$-cost, C , from today's sport. (2 points)

4.2

What is Greg's expected \$-cost, C , from today's sport? (2 points)

4.3

What is the variability in \$-cost, C , that Greg faces from today's sport? (4 points)

4.4

Greg's wife, Jenny, thinks the real cost of Greg playing a sport today is given by $(0.01C + 4)^2$. How much does Jenny think Greg playing a sport today will cost? (4 points)

5

Kyle goes out to eat with 3 friends and randomly orders 1 of the 11 entrees on the menu where 3 of the entrees contain chicken. They get seated at a rectangular table with 3 chairs on the north and south sides. (13 points)

5.1

How many ways can the group sit at the table? (2 points)

5.2

How many ways can the group have 3 people sit on the south side of the table? (3 points)

5.3

How many ways can the group have 2 people sit on the south side of the table? (3 points)

5.4

What are the chances Kyle orders an entree that contains chicken and 3 people sit on the north side of the table? (2 points)

5.5

What are the chances Kyle does not get 1 of the 3 entrees that contain chicken or 3 people do not sit on the north side of the table? (3 points)

6

Old Harry had a chocolate shop and in that chocolate shop he had a bar tender with a drink, drink here and a drink, drink there, here a drink, there a drink, everywhere a drink, drink. On a particular Friday evening, Old Harry's bar tender must have served 240 drinks at \$5 a drink and traditionally only gets 1 out of 200 drink orders wrong. Let W represent the number of drink orders that old Harry's bar tender got wrong and gave out for free on that particular Friday evening. (12 points)

6.1

Either construct the Probability Mass Function (PMF) or determine the distribution and its parameter(s) that define W . (2 points)

6.2

Is there a valid approximating distribution to the PMF or distribution that define W above? If yes, determine the distribution and its parameter(s) that approximate W . If no, explain what characteristics the PMF or distribution that define W above fail to meet to be approximated. (3 points)

6.3

What are the chances that old Harry's bar tender got more than two drink orders wrong that particular Friday evening. If you indicated an approximating distribution to the previous question it will be sufficient to solve this problem. (4 points)

6.4

What is the variability in the amount of revenue, R , that Old Harry's chocolate shop lost from incorrect drink orders on that particular Friday evening. If you indicated an approximating distribution above it will be sufficient to solve this problem. (3 points)

7

Johnny went to Vegas to play craps (a game of rolling 2 dice and observing their sum) and to roll a snake eyes (die sum = die 1 + die 2 = 1 + 1 = 2) a lucky 7 times. It cost Johnny \$5 per roll. Let S represent how many times Johnny rolled the dice. (12 points)

7.1

Either construct the Probability Mass Function (PMF) or determine the distribution and its parameter(s) that define S. (2 points)

7.2

What are the chances Johnny got his lucky 7 snake eyes on his $7^3 = 343^{rd}$ roll? (3 points)

7.3

Johnny got his 5^{th} snake eyes on his 250^{th} roll. On what roll is Johnny expected to get his lucky 7 roll, R? (3 points)

7.4

Johnny got his 6^{th} snake eyes on his 300^{th} roll. What are the chances Johnny got his lucky 7 snake eyes before his $7^3 = 343^{rd}$ roll? (4 points)

8

Keith took a random sample of 300 West Lafayette Purdue University graduate students to give \$25 of money, M , and a survey. It is reported that there are 7,565 such students, of which 250 are African-American, 291 are Asian, and 197 are Hispanic/Latino. Let H represent the number of Hispanic/Latino graduate students in the survey. (11 points)

8.1

Either construct the Probability Mass Function (PMF) or determine the distribution and its parameter(s) that define H . (2 points)

8.2

What is the approximate probability Keith gives \$250 of money, M , to Hispanic/Latino graduate students? (3 points)

8.3

What is the variability in the amount of money, M , that Keith will give to Hispanic/Latino graduate students? (4 points)

8.4

What is the approximate variability in the amount of money, M , that Keith will give to Hispanic/Latino graduate students? (2 points)