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Psychology 317 Exam #2
February 1, 2017

Instructions

1. Use a pencil, not a pen
2. Put your name on each page where indicated, and in addition, put your section on this page.
3. Exams will be due at 10:20!
4. If you find yourself having difficulty with some problem, go on to the rest of the problems, and return to the troublemaker if you have time at the end of the exam.
5. Leave your answers as reduced fractions or decimals to three decimal places.
6. **CIRCLE ALL ANSWERS: You will lose credit if an answer is not circled!!**
7. Check to make sure that you have all questions (see grading below)
8. **SHOW ALL YOUR WORK: An answer that appears from nowhere will receive no credit!!**
9. Don't Panic!
10. Good luck!

Grading

Problem	Points	Grader
1a-b	20	Adam
2a-c	20	Dominic
3a-b	20	Dominic
4a-e	20	Yiyu
5a-c	20	Yiyu
TOTAL	/100	

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1. Clark, a political scientist determines that there are more registered Republicans in Seattle, Washington than in Waco, Texas. Clark therefore concludes that "a random person from Seattle is a more likely to be Republican than a random person from Waco."

   a) What is potentially wrong with Clark's reasoning? Frame your answer in terms of the kinds of probability concepts that have been discussed in class. (10 points)

   b) Make up an example demonstrating that Seattle has more Republicans than Waco, but that a random person from Seattle is *less* likely to be a Republican than a random person from Waco. (10 points)

      HINT: Consider a sample space that consists *only* of people from Seattle plus people from Waco.

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2. Suppose that you flip two coins: a penny and a dime.

- The penny is biased such that it comes up heads with a probability of 0.7.
- The dime is biased such that it comes up heads with a probability of 0.4.

Consider a random variable that assigns to you the *number of* ***tails*** *that you get in the two flips*.

a) List the members of V, the set of all values that this random variable could assign. (3 points)

b) What is the theoretical probability distribution of V, i.e., the probability of each member of V? Also, compute the expected value of this probability distribution. (13 points)

c) Suppose that 200 people perform this exercise. What is theoretical frequency distribution of V, i.e., the expected frequency of each member of V? (4 points)

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3. Consider the following theoretical and empirical frequency distributions, below left.

Theoretical Distribution		Empirical Distribution	
v	f(v)	v	f(v)
0	1	0	5
1	2	1	1
2	8	2	6
3	20	3	19

Theoretical Distribution		Empirical Distribution	
v	p(v)	v	p(v)
0		0	
1		1	
2		2	
3		3	

a) Convert these frequency distributions into probability distributions. Insert your probabilities into the table above, right. (8 points)

b) Invent a measure that would reflect how different from one another the theoretical and empirical probability distributions are. This measure should be zero when the two distributions are exactly the same and should get bigger the more different the two distributions are from one another.

Be sure to explicitly state what your measure is.

What is the value of your measure for these two probability distributions? (12 points)

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4. GoToGeek.com, a new startup company in Tacoma, has six employees whose ages are as follows (and note: we have left extra rows for you to compute extra things if you wish):

1	2	3	4	5	6
23	15	14	22	22	18

From these data, compute **(and be sure to show your work for everything)**…

a) The mean, median, and mode employee age. (6 points)

b) The variance of employee age computed by using the deviation-score formula. (2 points)

c) The variance of employee age computed by using the raw-score formula. (2 points)

d) The standard deviation (5 points)

e) The mean employee age computed by making use of the empirical probability distribution formula (and in the process, *show* the empirical probability distribution). (5 points)

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5. The "Lynnwood Game" works as follows. The GameMaster repeatedly throws a die until the die comes up a “5”. At that point, the game stops and the player wins a value (in dollars) equal to three times the number of throws or $10.00, *whichever is less*.

a) List the members of V where V is the set of all values that a player could win. Compute the probability of each member of V (use the table below). (12 points)

NOTE: We’ve left enough room at the right of the table for you to enter other things, should you wish.

Number of throws	v (dollars)	p(v)

b) Suppose you play the Lynnwood Game 900 times. Each time you play, you record the amount you win. So you will wind up with 900 numbers. Now suppose you compute the sum and the mean of these 900 numbers. What would you expect this mean and this sum to be? (5 points)

c) Repeat Part b, but assume you play the Lynnwood Game 9,000 times. (3 points)