Final Examination

Math 125: December 16, 2022

To get full credit you must show your work. No work, no credit.

Each question is worth 9 points.

1. Someone has sketched one block of a family-income histogram for a wealthy suburb. About what percentage of the families in this suburb had incomes between \$90,000 and \$100,000 a year?



Answer: _____ percent

2. (a) Find the average and SD of the list 41, 48, 50, 50, 54, 57.

Average = _____

SD = _____

(b) Which numbers on the list are within 0.5 SDs of average? within 1.5 SDs of average?

Within 0.5 SDs: ______ (List the numbers. For example: 41, 48, and 50.)

3. On the Math SAT, men have a distinct edge. In 2005, for instance, the men averaged about 538, and the women averaged about 504.

You may assume (i) the histograms followed the normal curve, and (ii) both SDs were about 120.

(a) Estimate the percentage of men getting over 700 on this test in 2005.

Answer: _____ percent

(b) Estimate the percentage of women getting over 700 on this test in 2005.

Answer: _____ percent

4. Find the correlation coefficient for each of the two data sets shown below.

т	1	



Answer: _____

- 5. In one study, the correlation between the educational level of husbands and wives in a certain town was about 0.50; both averaged 12 years of schooling completed, with an SD of 3 years.
 - (a) Predict the educational level of a woman whose husband has completed 18 years of schooling.

Answer: _____ years

(b) Predict the educational level of a man whose wife has completed 15 years of schooling.

Answer: _____ years

(c) Apparently, well-educated men marry women who are less well educated than themselves. But the women marry men with even less education. How is this possible?

- 6. A die is rolled 10 times. Find the chance of—
 - (a) getting 10 sixes.

Answer: _____

(b) not getting 10 sixes.

Answer: _____

(c) all the rolls showing 5 spots or less.

Answer: _____

- 7. True or false, and explain:
 - (a) If a die is rolled three times, the chance of getting at least one ace is 1/6 + 1/6 + 1/6 = 1/2. Circle one: **TRUE FALSE** / Explain:
 - (b) If a coin is tossed twice, the chance of getting at least one head is 100%.Cricel one: TRUE FALSE / Explain:
- 8. A die will be rolled 6 times. What is the chance of obtaining exactly one \bigcirc ?

Answer: / or ____ percent

Write your answer either as an exact fraction, or rounded to the nearest whole percent.

9. (a) Complete the following table for the tossing of an unbiased coin.

	Number of heads		Percent of heads	
Number of tosses	Expected value	SE	Expected value	SE
100	50	5	50%	5%
2,500				1%
10,000				
1,000,000				

(b) Looking at the last two rows of this table, when the number of tosses increased from 10,000 to 1,000,000, by a factor of 100, what happened to the standard error for the percent?

It _____ [Choices {increased, decreased, remained the same}] (sentence continues) by a factor of _____.

FILL IN BOTH BLANKS, with a word or phrase and a number.

FINAL EXAM - MATH 125 (DEC. 16, 2022)

10. A simple random sample of 17-year-olds in high school was taken. Only 36.1% of the students in the sample knew that Chaucer wrote *The Canterbury Tales*.

If possible, find a 95%-confidence interval for the percentage of all 17-year-olds in high school who knew that Chaucer wrote *The Canterbury Tales*. If this is not possible, why not? Assume that there were 6,000 students in the sample.

Confidence interval is possible? (circle one) YES NO

If **NO**: explain. If **YES**: find interval and fill in both blanks below.

Confidence interval: ______ to _____

- 11. A survey organization takes a simple random sample of 625 households from a city of 80,000 households. On the average, there are 2.30 persons per sample household, and the SD is 1.75. Say whether each of the following statements is true or false, and explain.
 - (a) The 2.30 is 0.07 or so off the average number of persons per household in the whole city.
 - (b) A 95%-confidence interval for the average household size in the sample is 2.16 to 2.44.

(c) A 95%-confidence interval for the average household size in the city is 2.16 to 2.44.

(d) 95% of the households in the city contain between 2.16 and 2.44 persons.

- (e) The 95%-confidence level is about right because household size follows the normal curve.
- (f) The 95%-confidence level is about right because, with 625 draws from the box, the probability histogram for the average of the draws follows the normal curve.

12. Five hundred draws are made at random with replacement from a box of numbered tickets; 280 are positive. Someone tells you that 50% of the tickets in the box show positive numbers.

Use the sample data to assess whether or not this claim is credible and indicate your conclusion below.

You will only receive full credit if you clearly state your null and alternative hypotheses, set up a box model, and run a test of hypotheses. You should base your conclusion on the results of that test.