

Math 1350: Final Exam

Math 1350
Spring 2020
04/16/20

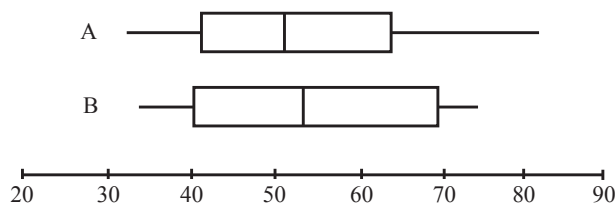
Name: _____

You may use one page of notes (front and back) and your calculator on this exam. For full credit, please show all of your work on each problem.

Questions 1-10 are multiple choice. Please circle the letter corresponding to your answer.

1. (2 points) A report states that the mean household income in a certain town was \$53,208 while the median income was \$49,770. If a histogram were constructed for the household incomes, it would be _____.
 - A. skewed left
 - B. skewed right
 - C. symmetric
 - D. bimodal
2. (2 points) Determine which of the following describes ordinal qualitative data.
 - i The jersey numbers (e.g. 1, 23, 88, 24, etc.) of players on a team.
 - ii The level of fitness (e.g. excellent, good, fair, poor, etc.) of players on a team.
 - A. i only
 - B. ii only
 - C. both i and ii
 - D. neither i nor ii
3. (2 points) To decide who advances on the TV show American Idol, viewers are solicited to text in a vote for their preferred artist. Identify the type of sample that is being used.
 - A. stratified sample
 - B. systematic sample
 - C. voluntary response sample
 - D. cluster sample
4. (2 points) A coin is flipped 680 times and lands on heads 352 times. Use the Empirical Rule to approximate the probability that the coin will land on heads.
 - A. 0.500
 - B. 0.518
 - C. 0.482
 - D. 0.352

5. (2 points) The boxplots below represent two data sets, A and B.



Which of the options below must be true?

- i set A contains more data than set B
 - ii the data in set A has a larger range than the data in set B
- A. i only
B. ii only
C. i and ii must both be true
D. neither i nor ii must be true
6. (2 points) Determine which of the following describes qualitative data.
- i a person's weight
 - ii a person's blood pressure
 - iii a person's blood type
- A. i only
B. ii only
C. iii only
D. i and ii only
7. (2 points) If $P(A) = 0.22$, $P(B) = 0.61$, and A and B are mutually exclusive, what is $P(A \text{ or } B)$.
- A. 0
B. 0.83
C. 0.39
D. 0.17
8. (2 points) A 99% confidence interval for a sample of $n = 42$ heart rate readings has a margin of error of $m = 5.7$ beats per minute. It is determined that 12 of the readings used faulty equipment and should be disregarded leaving only $n = 30$ samples. If all else stays the same, what will happen to the margin of error?
- A. The value of m will not change. The margin of error is unrelated to the sample size.
B. The value of m will increase.
C. The value of m will decrease.
D. There isn't enough information to determine the answer.

9. (2 points) A 99% confidence interval for a sample of $n = 42$ heart rate readings has a margin of error of $m = 5.7$ beats per minute. If all else stays the same but we instead compute a 95% confidence interval, what will happen to the margin of error?
- A. The value of m will not change. The margin of error is unrelated to the confidence level.
 - B. The value of m will increase.
 - C. The value of m will decrease.
 - D. There isn't enough information to determine the answer.
10. (2 points) If $P(A) = 0.42$, $P(B) = 0.37$, and A and B are mutually exclusive, what is $P(A \text{ or } B)$.
- A. 0
 - B. 0.79
 - C. 0.21
 - D. 0.05
11. (10 points) The number of home runs that Hank Aaron hit during the years 1956 to 1970 are listed below in chronological order.

26, 44, 30, 39, 40, 34, 45, 44, 24, 32, 44, 39, 29, 44, 38

- (a) Find the mean of the data. Round your answer to one decimal place, including units.
- (b) Find the median of the data, including units.
- (c) Find the mode of the data, including units.
- (d) Find the sample standard deviation of the data.
- (e) Give the 5 number summary of the data.

12. (20 points) In a simple random sample of 78 CNM students, 48 reported having jobs outside of school. Construct a 95% confidence interval for the proportion of CNM students with jobs.
- (a) Compute the point estimate.
 - (b) Compute the critical value.
 - (c) Compute the standard error.
 - (d) Compute the margin of error.
 - (e) Give the confidence interval.
 - (f) Summarize the findings of the confidence interval in a sentence.

13. (10 points) A person buys 10 scratch-off lottery tickets. Each ticket has a 1 in 10 chance of being a winning ticket. Let the random variable X represent the number of winning scratch-offs.

- (a) What type of probability distribution will X follow?
- (b) Compute the probability of getting more than 2 winning scratch-offs. Round to three decimals.
- (c) What is the expected value, $E(X)$, of the number of winning scratch-offs?

14. (10 points) The table below provides data on five used cars, reporting year of manufacture (in years since 2000) and miles driven (in thousands).

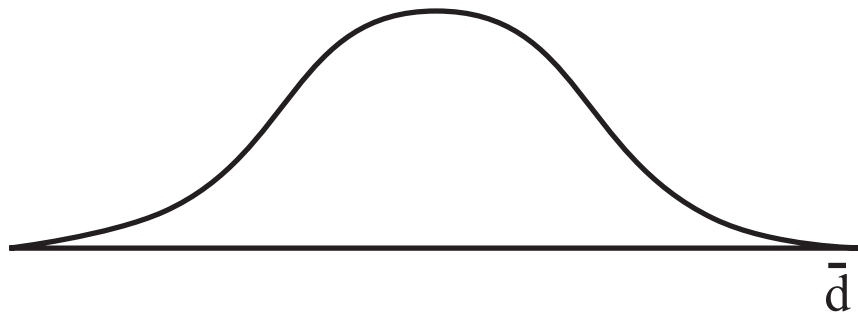
Year of Manufacture (x)	05	08	10	12	13
Miles Driven (in 1000's) (y)	132	71	88	30	45

- (a) Calculate the linear correlation coefficient. Is the correlation positive or negative? Strong or weak?
- (b) Determine the equation of the least squares regression line.
- (c) How many miles would we expect a car from 2011 to have?

15. (20 points) SmArT Academy, an SAT test prep company, claims that their program improves student scores). A simple random sample of 37 students took the SAT before taking the prep course and then again after taking the prep course. The average increase in their scores after taking the course was 40 points with a standard deviation of 120 points. What can we conclude about the SmArT Academy's claim that the course improves scores? Use a significance level of $\alpha = 0.05$ and the P-value method.
- (a) What is the appropriate distribution (normal or t) to use for our calculations?
 - (b) State the null and alternate hypothesis. Is the alternate hypothesis left, right, or two-tailed?
 - (c) Give the significance level, α . What does this value represent?
 - (d) Compute the test statistic.

(e) Compute the P-value of the test statistic. What does this value represent?

(f) Indicate the position of the test statistic and draw the regions representing α and the P-value in the figure below.



(g) Determine whether to reject the null hypothesis. Make sure to indicate criteria you are using to make this determination.

(h) State your conclusions in plain English.

16. (10 points) A survey of 14 random CNM students found them to have the following ages.

18, 19, 21, 31, 25, 17, 19, 28, 20, 23, 24, 26, 37, 22

- (a) Construct a relative frequency distribution of the ages recorded. Make sure to include columns for both the frequency and relative frequency. Use 5 classes each with a class width of 5. Start with the lower class limit for the lowest class at 15.

- (b) Construct a histogram showing the frequency of the ages. Make sure to appropriately label your graph.