

MATH 3307

Homework 4 (Lessons 12 - 14)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named "Homework 4" before the deadline.

There is no "Submit" button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

1. Is the following a binomial or geometric distribution: Roll a pair of dice 10 times and count the number of times the sum is 6.

- A. Binomial B. Geometric C. Cannot Determine

Base Questions 2 - 4 on the following: Of the automobiles produced at a particular plant, 40% have a certain defect.

2. What is probability that more than 50 cars will need to be inspected before finding one with this defect?

- A. ≈ 1 B. 0.9533 C. 0.0260 D. 0.0054 E. ≈ 0

3. What is the probability that the twentieth car inspected will have this defect?

- A. 0.0405 B. 0.9427 C. ≈ 0 D. 0.40 E. ≈ 1

4. Suppose a company purchases five of these cars. What is the probability that exactly one of these five will have this defect?

- A. 0.2592 B. 0.3370 C. 0.9533 D. 0.0311 E. 0.40

For Questions 5 - 8, consider the following: A probability density curve consists of two line segments. The first connects the points: (0, 1) and (0.7, 1). The second connects (0.7, 1) and (1.3, 0).

5. Determine $P(X < 0.5)$.

6. Determine $P(0.7 < X < 1.3)$.

7. Determine $P(X > 0.2)$.

8. Determine $P(X = 0.5)$.

Choices for Questions 5, 6, 7, and 8:

- A. 0.0 B. 0.3 C. 0.5 D. 0.8 E. 1.0

For Questions 9 - 11, consider the following: A uniform probability distribution has a domain of $[1, 5]$.

9. Determine $P(X < 1.5)$.

10. Determine $P(X > 2.5)$.

11. Determine $P(X < 1)$.

Choices for Questions 9, 10, and 11:

A. 0.0 B. 0.125 C. 0.25 D. 0.5 E. 0.625

12. Consider the probability density curve illustrated here. What can be determined from this graph?

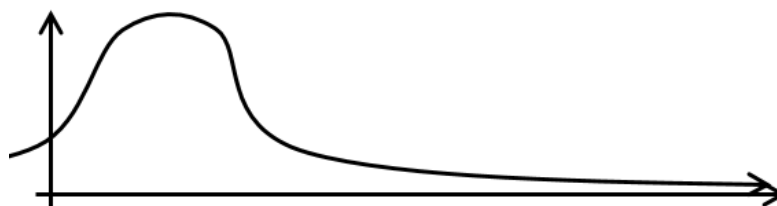
A. Mean $<$ Median

B. Mean $>$ Median

C. Median $>$ Mean

D. There is left skew to the distribution.

E. Nothing can be determined without additional information.



Use the following description to answer questions 13 - 16:

A density curve consists of the line segment connecting the points $(0,1)$ and $(0.5,1)$, and the segment connecting $(0.5, 1)$ to the x-axis.

13. Determine the coordinate point where the second segment crosses the x-axis.

A. $(0.5, 0)$ B. $(1.0, 0)$ C. $(1.5, 0)$

D. $(2.0, 0)$ E. $(2.5, 0)$

14. Determine the slope of that segment.

A. $m = -2$ B. $m = -1.5$ C. $m = -1$

D. $m = -0.5$ E. $m = -0.25$

15. Determine the equation of the line containing this segment.

A. $y = -1.5x + 2$

B. $y = -x + 1.5$

C. $y = -x + 2$

D. $y = -2x + 1.5$

E. $y = -1.5x + 2.5$

16. Calculate the probability of $P(X > 1)$.

A. 0.0625

B. 0.125

C. 0.25

D. 0.325

E. 0.5

17. The length of time needed to complete a certain test is normally distributed with a mean of 57 and a standard deviation of 8. Determine (a) the percent of people that take between 49 and 65 minutes to complete the exam, and (b) the interval of completion times containing the middle 95% of test-takers.

A. (a) 95% (b) [41, 73] B. (a) 95% (b) [49, 65]

C. (a) 68% (b) [49, 65] D. (a) 68% (b) [41, 73] E. (a) 99.7% (b) [33, 81]

18. The GRE is a widely used exam to help predict the performance of applicants to graduate schools. The range of possible scores is 200 to 900. The psychology department of a certain university determined that their students have a mean score of 544 and a standard deviation of 103. Determine (a) the probability of a student in the psychology department having a score less than 480, and (b) the probability that a student from that department has a score between 480 and 730.

A. (a) 0.2672 (b) 0.6973

B. (a) 0.2672 (b) 0.0128

C. (a) 0.7328 (b) 0.6973

D. (a) 0.7328 (b) 0.0128

E. (a) 0.5 (b) 0.2551

19. In a certain population, there is a known $\mu = 56$ and $\sigma = 12$. Which of the following descriptions indicates that this measure could, possibly be, normally distributed?

- A. Approximately 95% of the population falls within in the interval [44, 68].
- B. The median of the population is determined to be at the value of 44.
- C. The same percentage of the population falls within intervals of equal width (for example, the intervals [56, 60] and [80, 84] would contain equal percentages of the population since they are both width 4).
- D. There is a greater percentage of the population represented for larger values rather than smaller.
- E. When graphed, the density curve is a symmetric, single-peaked shape.

20. Weights of American adults are normally distributed with a mean of 180 pounds and a standard deviation of 8 pounds. What is the probability that a randomly selected individual will be between 185 and 190 pounds?

Proposed Solution:

`pnorm(190-185,180,8) = 2.24756e-106`, which is essentially 0.

What was done wrong in the proposed solution?

- A. In using the `pnorm` command in R-Studio, you cannot include subtraction (or other operations) within your arguments.
- B. The calculated value of `2.24756e-106` is not essentially 0.
- C. Two `pnorm` commands must be calculated separately and their results subtracted rather than subtracting the values first.
- D. The order of arguments in the `pnorm` command are not correct, but should be `pnorm(mean, standard deviation, x-value)`.
- E. There is nothing wrong with the proposed calculation.

