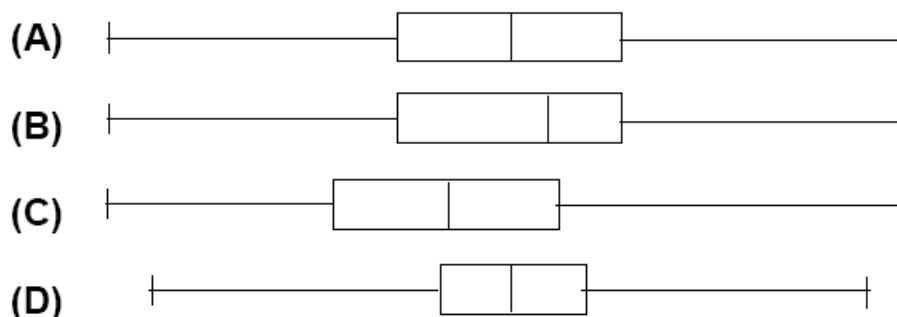# Classroom Voting Questions:
Statistics

Density Curves and Normal Distributions

1. If a large sample were drawn from a normal distribution and accurately represented the population, which of the following is most likely to be a box plot of that sample?


(E) Two from (A)-(D) are correct.

(F) Three from (A)-(D) are correct.

(G) All from (A)-(D) are correct.

2. Consider the continuous random variable $X =$ the weight in pounds of a randomly selected newborn baby born in the United States last year. Suppose that X can be modeled with a normal distribution with mean $\mu = 7.57$ and standard deviation $\sigma = 1.06$. If the standard deviation were $\sigma = 1.26$ instead, how would that change the graph of the pdf of X?

   (a) The graph would be narrower and have a greater maximum value.

   (b) The graph would be narrower and have a lesser maximum value.

   (c) The graph would be narrower and have the same maximum value.

   (d) The graph would be wider and have a greater maximum value.

   (e) The graph would be wider and have a lesser maximum value.

   (f) The graph would be wider and have the same maximum value.

3. Consider the continuous random variable X = the weight in pounds of a randomly newborn baby born in the United States during 2006. Suppose that X can be modeled with a normal distribution with mean $\mu = 7.57$ and standard deviation $\sigma = 1.06$. If the mean were $\mu = 7.27$ instead, how would that change the graph of the pdf of X?

   (a) The graph would be shifted to the left.

   (b) The graph would be shifted to the right.

   (c) The graph would become more negatively skewed.

   (d) The graph would become more positively skewed.

   (e) The graph would have a greater maximum value.

   (f) The graph would have a lesser maximum value.

4. If X is a normal random variable with mean $\mu = 20$ and standard deviation $\sigma = 4$, which of the following could be the graph of the pdf of X?

5. Find $z_{0.15}$.

   (a) 1.04
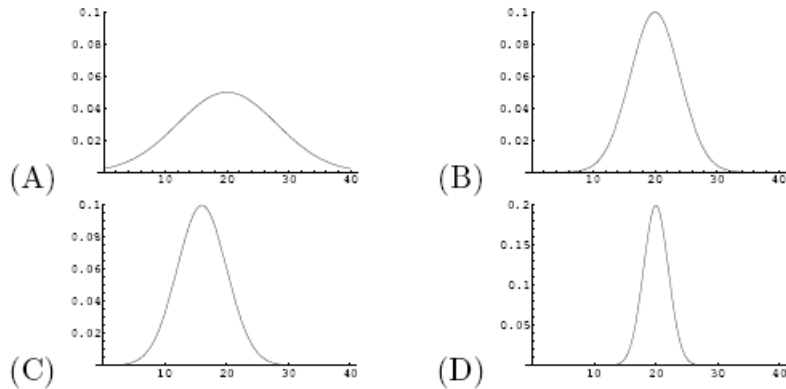
   (b) -1.04

6. Yogurt is sold in cartons labeled as containing 6 oz, but the actual contents vary slightly from container to container. Suppose that the content distribution is approximately normal in shape with a mean of 6 oz and a standard deviation of 0.05 oz. What can be said about the percentage of cartons that have actual contents less than 5.95 oz?

   (a) The percentage is approximately 68%

   (b) The percentage is approximately 34%

   (c) The percentage is approximately 32%

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(d) The percentage is approximately 16%

7. The University of Oklahoma has changed its admission standards to require an ACT-score of 26. We know the ACT is normally distributed with a mean of 21 and an SD of 5. If we sample 100 students who took the ACT at random, how many would be expected to qualify for admission to OU?

    (a) 5
    (b) 16
    (c) 34
    (d) 84
    (e) none of the above

8. A colleague has collected 1000 old VW vans for resale. The colleague, an old stats professor, will only sell a van to those who can answer the following question: The -2 SD sales price for one of these vans is set at \$550; and $+2$ SD sales price is set at \$1100. He tells you the distribution of sales prices is approximately normal. What is the expected number of vans for sale between \$550 and \$1100?

    (a) 500
    (b) 680
    (c) 750
    (d) 888
    (e) 950

9. The heights of women are normally distributed with a mean of 65 inches and an SD of 2.5 inches. The heights of men are also normal with a mean of 70 inches. What percent of women are taller than a man of average height?

    (a) 0.15%
    (b) 2.5%
    (c) 5%
    (d) 16%
    (e) insufficient information

10. Many psychological disorders (e.g. Depression, ADHD) are based on the application of the 2 SD rule assuming a normal distribution of reported symptoms. This means that anyone who reports a symptom count that is greater than the 2 SD point in a normal population can be considered to be "abnormal" or "disordered".

    Given this definition of "disorder", what is expected prevalence rate of these disorders based on the 2 SD rule?

(a) 0.15%

(b) 2.5%

(c) 5%

(d) 16%

(e) 95%

11. The ACT has a mean of 21 and an SD of 5. The SAT has a mean of 1000 and a SD of 200. Joe Bob Keith took the ACT and he needs a score of 1300 on the SAT to get into UNC-Chapel Hill and a score of 1400 on the SAT to get into Duke. UNC and Duke both told Joe Bob Keith that they will convert the ACT to the SAT using a z-score (or standard-score) transformation. Joe Bob Keith has decided to go to the school with the highest standards that will accept him. If he doesn't qualify for either Duke or UNC, then it's Faber College for Joe Bob Keith. As it turns out, Joe Bob Keith got a 30 on the ACT, but he cannot figure out what that means for his choice of college. Help Joe Bob Keith out. Where is he going to school?

(a) UNC

(b) Duke

(c) Faber

12. Let Z be a standard normal random variable. Which of the following probabilities is the smallest?

(a) $P(-2 < Z < -1)$

(b) $P(0 < Z < 2)$

(c) $P(Z < 1)$

(d) $P(Z > 2)$

13. Let Z be a standard normal random variable. Which of the following probabilities is the smallest?

(a) $P(0 \leq Z \leq 2.07)$

(b) $P(-0.64 \leq Z \leq -0.11)$

(c) $P(Z > -1.06)$

(d) $P(Z < -0.88)$

14. 77% of the area under a normal curve lies to the left of what z-score?

(a) 0.74

(b) 0.77

(c) $z_{0.77}$

(d) 0.78

15. Intelligence quotients (IQs) are normally distributed with a mean of 100 and a standard deviation of 16. What percentage of the population has an IQ between 112 and 116?

(a) 4%

(b) 7%

(c) 9%

(d) 25%

16. Intelligence quotients (IQs) are normally distributed with a mean of 100 and a standard deviation of 16. Find Q_3 for IQ.

(a) 111

(b) 112

(c) A continuous distribution does not have quartiles.

17. Jeannie works at the drive-through window at a local fast-food restaurant. In the middle of the afternoon, the mean time between customers arriving at the window is 5 minutes with a standard deviation of 5 minutes. As a customer drives up to the window, Jeannie is wondering what the probability is that the next customer will arrive more than 10 minutes from now. TRUE or FALSE: Jeannie should convert 10 into a z-score and then find the area to the right of that z-score under the standard normal curve.

(a) True, and I am very confident.

(b) True, and I am not very confident.

(c) False, and I am not very confident.

(d) False, and I am very confident.

18. Which of the following is not a reason for constructing a normal probability plot or a normal quantile plot?

(a) You are about to perform an inferential statistics procedure.

(b) You have computed a five-number summary and would like to display the results.

(c) You are concerned about outliers.

(d) You are concerned about skewness.