AP Statistics Name _____

Ch. 2 Review #2

1. The lengths of individual shellfish in a population of 10,000 shellfish are approximately normally distributed with mean 10 centimeters and standard deviation 0.2 centimeters. Which of the following is the shortest interval that contains approximately 4,000 shellfish lengths?

(A) 0 cm to 9.949 cm
(B) 9.744 cm to 10 cm
(C) 9.744 cm to 10.256 cm
(D) 9.895 cm to 10.105 cm
(E) 9.9280 cm to 10.080 cm

2. The statistics below provide a summary of the distribution of heights, in inches, for a simple random sample of 200 young children.

Mean: 46 inches
Median: 45 inches
Standard Deviation : 3 inches
First Quartile: 43 inches
Third Quartile: 48 inches

About 100 children in the sample have heights that are
(A) less than 43 inches (B) less than 48 inches (C) between 43 and 48 inches
(D) between 40 and 52 inches (E) more than 46 inches

3. The distribution of the diameters of a particular variety of oranges is approximately normal with a standard deviation of 0.3 inch. How does the diameter of an orange at the 67^{th} percentile compare with the mean diameter?

(A) 0.201 inch below the mean
(B) 0.132 inch below the mean
(C) 0.132 inch above the mean
(D) 0.201 inch above the mean
(E) 0.440 inch above the mean

4. Let X represent a random variable whose distribution is normal, with a mean of 100 and a standard deviation of 10. Which of the following is equivalent to $P(X > 115)$?

(A) $P(X < 115)$
(B) $P(X \leq 115)$
(C) $P(X < 85)$
(D) $P(85 < P < 115)$
(E) $1 - P(X < 85)$

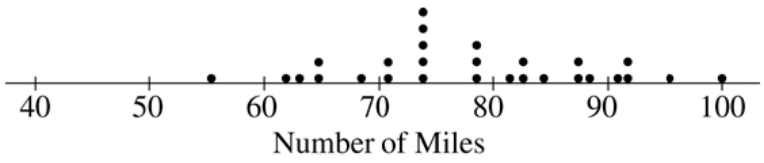
5. Suppose that the distribution of a set of scores has mean of 47 and a standard deviation of 14. If 4 is added to each score, what will be the mean and the standard deviation of the distribution of new scores?

	Mean	Standard Deviation
(A)	51	14
(B)	51	18
(C)	47	14
(D)	47	16
(E)	47	18

6. The weights of a population of adult male gray whales are approximately normally distributed with a mean weight of 18,000 kilograms and a standard deviation of 4,000 kilograms. The weights of a population of adult male humpback whales are approximately normally distributed with a mean weight of 30,000 kilograms and a standard deviation of 6,000 kilograms. A certain adult male gray whale weighs 24,000 kilograms. This whale would have the same standardized weight (z-score) as an adult male humpback whale whose weight, in kilograms, is equal to which of the following?

(A) 21,000 (B) 24,000 (C) 30,000 (D) 36,000 (E) 39,000

7. The dotplot below displays the total number of miles that the 28 residents on one street in a certain community traveled to work in one five-day workweek.



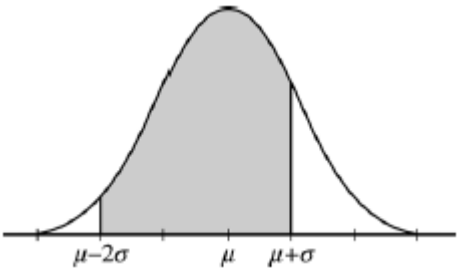
Which of the following is closest to the percentile rank of a resident from this street who traveled 85 miles to work that week?

(A) 60 (B) 70 (C) 75 (D) 80 (E) 85

8. A distribution of test scores is not symmetric. Which of the following is the best estimate of the z-score of the third quartile?

(A) 0.67 (B) 0.75 (C) 1.00 (D) 1.41
(E) This z-score cannot be estimated from the information given.

9. A certain type of remote-control car has a fully charged battery at the time of purchase. The distribution of running times of cars of this type, before they require recharging of the battery for the first time after its period of initial use, is approximately normal with a mean of 80 minutes and a standard deviation of 2.5 minutes. The shaded area in the figure below represents which of the following probabilities?



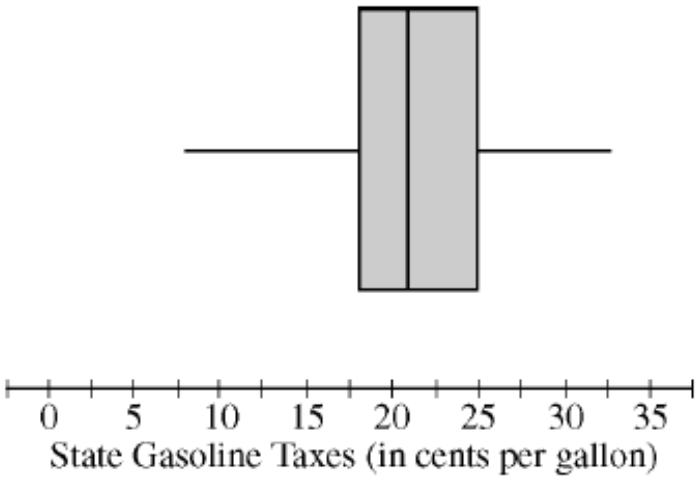
(A) The probability that the running time of randomly selected car of this type, before it requires recharging of the battery for the first time after its period of initial use is between 75 minutes and 82.5 minutes.
(B) The probability that the running time of randomly selected car of this type, before it requires recharging of the battery for the first time after its period of initial use is between 75 minutes and 85 minutes.
(C) The probability that the running time of randomly selected car of this type, before it requires recharging of the battery for the first time after its period of initial use is between 77.5 minutes and 82.5 minutes.
(D) The probability that the running time of randomly selected car of this type, before it requires recharging of the battery for the first time after its period of initial use is between 77.5 minutes and 85 minutes.
(E) The probability that the running time of randomly selected car of this type, before it requires recharging of the battery for the first time after its period of initial use is between 77.5 minutes and 87.5 minutes.

10. The commuting time for a student to travel from home to a college campus is normally distributed with a mean of 30 minutes and a standard deviation of 5 minutes. If the student leaves home at 8:25 A.M., what is the probability that the student will arrive at the college campus later than 9 A.M.?

(A) 0.16 (B) 0.32 (C) 0.50 (D) 0.84 (E) 1.00

Free Response

11. As gasoline prices have increased in recent years, many drivers have expressed concern about the taxes they pay on gasoline for their cars. In the United States, gasoline taxes are imposed by both the federal government and by individual states. The boxplot below shows the distribution of the state gasoline taxes, in cents per gallon, for all 50 states on January 1, 2006.



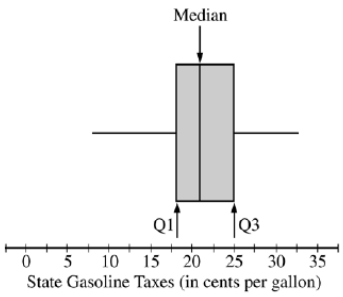
(a) Based on the boxplot, what are the approximate values of the median and the interquartile range of the distribution of state gasoline taxes, in cents per gallon? Mark and label the boxplot to indicate how you found the approximated values.

(b) The federal tax imposed on gasoline was 18.4 cents per gallon at the time the state taxes were in effect. The federal gasoline tax was added to the state gasoline tax for each state to create a new distribution of combined gasoline taxes. What are approximate values, in cents per gallon, of the median and interquartile range of the new distribution of combined gasoline taxes? Justify your answer

Answers.

1. D (Which interval would capture 40% (4000/10000) of the data)
2. C (It does not say that this data is normally distributed, don't assume it)
3. C (Find the z-score for the 67th percentile and multiply by .3)
4. C
5. A (Adding to data only effects the measures of center, the mean)
6. E
7. B
8. E (You would need to see the distribution in order to calculate this)
9. A
10. A

11. a.



The median and quartiles are marked and labeled on the boxplot above. The median is approximately 21 cents per gallon. The first and third quartiles are approximately 18 cents per gallon and 25 cents per gallon, respectively. The IQR is Q3 – Q1, which is approximately 25 – 18 = 7 cents per gallon.

b. After adding 18.4 cents per gallon to each of the state taxes, the median of the combined gasoline taxes would be the median of the state tax plus the federal tax, which is approximately 21 + 18.4 = 39.4 cents per gallon. Although the quartiles of the combined gasoline taxes will change (Q1 = 18 + 18.4 = 36.4 cents per gallon and Q3 = 25 + 18.4 = 43.4 cents per gallon), the IQR will remain the same as it was for the state taxes at 7 cents per gallon (43.4 – 36.4 = 7).