Practice Examination 5

SECTION I

Questions 1–40

Spend 90 minutes on this part of the exam.

Directions: The questions or incomplete statements that follow are each followed by five suggested answers or completions. Choose the response that best answers the question or completes the statement.

1. The mean and standard deviation of the population {1, 5, 8, 11, 15} are $\mu = 8$ and $\sigma = 4.8$, respectively. Let S be the set of the 125 *ordered* triples (repeats allowed) of elements of the original population. Which of the following is a correct statement about the mean $\mu_{\bar{x}}$ and standard deviation $\sigma_{\bar{x}}$ of the means of the triples in S?

   (A) $\mu_{\bar{x}} = 8$, $\sigma_{\bar{x}} = 4.8$
   (B) $\mu_{\bar{x}} = 8$, $\sigma_{\bar{x}} < 4.8$
   (C) $\mu_{\bar{x}} = 8$, $\sigma_{\bar{x}} > 4.8$
   (D) $\mu_{\bar{x}} < 8$, $\sigma_{\bar{x}} = 4.8$
   (E) $\mu_{\bar{x}} > 8$, $\sigma_{\bar{x}} > 4.8$

2. A survey to measure job satisfaction of high school mathematics teachers was taken in 1993 and repeated 5 years later in 1998. Each year a random sample of 50 teachers rated their job satisfaction on a 1-to-100 scale with higher numbers indicating greater satisfaction. The results are given in the following back-to-back stemplot.

1993		1998
	0	
98775	1	
98530	2	1
65210	3	3589
96430	4	01122233455667889999
87421	5	035667899
99877555322100	6	1344789
976442	7	22689
7511	8	138
0	9	7

What is the trend from 1993 to 1998 with regard to the standard deviation and range of the two samples?

(A) Both the standard deviation and range increased.
(B) The standard deviation increased, while the range decreased.
(C) The range increased, while the standard deviation decreased.
(D) Both the standard deviation and range decreased.
(E) Both the standard deviation and range remained unchanged.

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3. Consider the following studies being run by three different AP Statistics instructors.

   I. One rewards students every day with lollipops for relaxation, encouragement, and motivation to learn the material.
   II. One promises that all students will receive A's as long as they give their best efforts to learn the material.
   III. One is available every day after school and on weekends so that students with questions can come in and learn the material.

   (A) None of these studies use randomization.
   (B) None of these studies use control groups.
   (C) None of these studies use blinding.
   (D) Important information can be found from all these studies, but none can establish causal relationships.
   (E) All of the above.

4. The number of days it takes to build a new house has a variance of 386. A sample of 40 new homes shows an average building time of 83 days. With what confidence can we assert that the average building time for a new house is between 80 and 90 days?

   (A) 15.4%
   (B) 17.8%
   (C) 20.0%
   (D) 38.8%
   (E) 82.2%

5. A shipment of resistors have an average resistance of 200 ohms with a standard deviation of 5 ohms, and the resistances are normally distributed. Suppose a randomly chosen resistor has a resistance under 194 ohms. What is the probability that its resistance is greater than 188 ohms?

   (A) .07
   (B) .12
   (C) .50
   (D) .93
   (E) .97

6. Suppose 4% of the population have a certain disease. A laboratory blood test gives a positive reading for 95% of people who have the disease and for 5% of people who do not have the disease. If a person tests positive, what is the probability the person has the disease?

   (A) .038
   (B) .086
   (C) .442
   (D) .558
   (E) .950

7. For which of the following is it appropriate to use a census?

   (A) A 95% confidence interval of mean height of teachers in a small town.
   (B) A 95% confidence interval of the proportion of students in a small town who are taking some AP class.
   (C) A two-tailed hypothesis test where the null hypothesis was that the mean expenditure on entertainment by male students at a high school is the same as that of female students.
   (D) Calculation of the standard deviation in the number of broken eggs per carton in a truckload of eggs.
   (E) All of the above.

8. On the same test, Mary and Pam scored at the 64th and 56th percentiles, respectively. Which of the following is a true statement?

   (A) Mary scored eight more points than Pam.
   (B) Mary's score is 8% higher than Pam's.
   (C) Eight percent of those who took the test scored between Pam and Mary.
   (D) Thirty-six people scored higher than both Mary and Pam.
   (E) None of the above.

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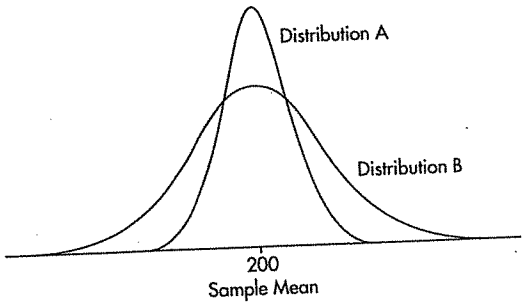
9. Which of the following is a true statement?

(A) While observational studies gather information on an already existing condition, they still often involve intentionally forcing some treatment to note the response.
(B) In an experiment, researchers decide on the treatment but typically allow the subjects to self-select into the control group.
(C) If properly designed, either observational studies or controlled experiments can easily be used to establish cause and effect.
(D) Wording to disguise hidden interests in observational studies is the same idea as blinding in experimental design.
(E) Stratifying in sampling is the same idea as blocking for experiments.

10. The random variable describing the number of minutes high school students spend in front of a computer daily has a mean of 200 minutes. Samples of two different sizes result in sampling distributions with the two graphs below.



Which of the following is a true statement?

(A) Based on these graphs, no comparison between the two sample sizes is possible.
(B) More generally, sample sizes have no effect on sampling distributions.
(C) The sample size in A is the same as the sample size in B.
(D) The sample size in A is less than the sample size in B.
(E) The sample size in A is greater than the sample size in B.

11. To determine the mean cost of groceries in a certain city, an identical grocery basket of food is purchased at each store in a random sample of ten stores. If the average cost is \$47.52 with a standard deviation of \$1.59, find a 98% confidence interval estimate for the cost of these groceries in the city.

(A) $47.52 \pm 2.33\sqrt{1.59}$
(B) $47.52 \pm 2.33\left(\frac{1.59}{\sqrt{10}}\right)$
(C) $47.52 \pm 2.33\left(\sqrt{\frac{1.59}{10}}\right)$
(D) $47.52 \pm 2.821\left(\frac{1.59}{\sqrt{10}}\right)$
(E) $47.52 \pm 2.821\sqrt{\frac{1.59}{10}}$

12. A set consists of four numbers. The largest value is 200, and the range is 50. Which of the following statements is true?

(A) The mean is less than 185.
(B) The mean is greater than 165.
(C) The median is less than 195.
(D) The median is greater than 155.
(E) The median is the mean of the second and third numbers if the set is arranged in ascending order.

13. A telephone survey of 400 registered voters showed that 256 had not yet made up their minds 1 month before the election. How sure can we be that between 60% and 68% of the electorate were still undecided at that time?

(A) 2.4%
(B) 8.0%
(C) 64.0%
(D) 90.5%
(E) 95.3%

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