

Standard Deviations PS Problems

1. Which of the following sets has the standard deviation greater than the standard deviation of set $A = \{10, 12, 14, 16, 18, 20, 22, 24, 26, 28\}$
 - I. Set B, which consists of 10 first positive integers
 - II. Set C, which consists of 10 first positive odd numbers
 - III. Set D, which consists of 10 first prime numbers
 - A. set B only
 - B. set C only
 - C. set D only
 - D. sets C and D only
 - E. sets B, C and D
2. Which of the following sets must have the same standard deviation as set $\{a, b, c\}$?
 - A. $\{ab, b^2, cb\}$
 - B. $\{2a, b + a, c + b\}$
 - C. $\{0, b + a, c - a\}$
 - D. $\{ab, bc, ac\}$
 - E. $\{ab + c, a(1 + b), b(1 + a)\}$
3. The residents of Town X participated in a survey to determine the number of hours per week each resident spent watching television. The distribution of the results of the survey had a mean of 21 hours and a standard deviation of 6 hours. The number of hours that Pat, a resident of Town X, watched television last week was between 1 and 2 standard deviations below the mean. Which of the following could be the number of hours that Pat watched television last week?
 - A. 30
 - B. 20
 - C. 18
 - D. 12
 - E. 6
4. Set S consists of positive numbers. If -1 is added as an element to set S, which of the following is impossible?
 - A. The mean will decrease but median will not change.
 - B. The median will decrease but mean will not change.
 - C. The range will increase but median will not change.
 - D. The range will increase but mean will decrease.
 - E. The standard deviation will increase but mean will decrease.

5. A certain list of 200 test scores has an average (arithmetic mean) of 85 and a standard deviation of d , where d is positive. Which of the following two test scores, when added to the list, must result in a list of 202 test scores with a standard deviation less than d ?
- (A) 80 and 80
 - (B) 80 and 85
 - (C) 80 and 90
 - (D) 85 and 85
 - (E) 85 and 90
6. A set of data consists of the following 5 numbers: 0, 2, 4, 6, and 8. Which two numbers, if added to create a set of 7 numbers, will result in a new standard deviation that is close to the standard deviation for the original 5 numbers?
- A. -1 and 9
 - B. 4 and 4
 - C. 3 and 5
 - D. 2 and 6
 - E. 0 and 8
7. Set A consists of all even integers between 2 and 100, inclusive. Set X is derived by reducing each term in set A by 50, set Y is derived by multiplying each term in set A by 1.5, and set Z is derived by dividing each term in set A by -4. Which of the following represents the ranking of the three sets in descending order of standard deviation?
- (A) X, Y, Z
 - (B) X, Z, Y
 - (C) Y, Z, X
 - (D) Y, X, Z
 - (E) Z, Y, X
8. Set Q consists of n integers, of which the standard deviation is D and the average (arithmetic mean) is M . If integer N is added to set Q, the standard deviation of the new set is less than D . Which of the following must be true?
- I. $N > M$
 - II. $N < M$
 - III. $N < D$
- A. I only
 - B. II only
 - C. III only
 - D. II & III only
 - E. None of the above

9. 70,75, 80,85,90,105,105,130,130,130

The list consists of the times in seconds that it took each of the 10 school children to run a distance of 400 mts . If the standard deviation of the 10 running times is 22.4, rounded to the nearest tenth of a second, how many of the 10 running times are more than 1 standard deviation below the mean of the 10 running times.

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

10. If M is a negative integer and K is a positive integer, which of the following could be the standard deviation of a set $\{-7, -5, -3, M, 0, 1, 3, K, 7\}$?

- I. -1.5
- II. -2
- III. 0

- (A) I only
- (B) II only
- (C) III only
- (D) I and III only
- (E) None

11. E is a collection of four ODD integers and the greatest difference between any two integers in E is 4. The standard deviation of E must be one of how many numbers?

- (A) 3
- (B) 4
- (C) 5
- (D) 6
- (E) 7

12. If a certain sample of data has a mean of 20.0 and a standard deviation of 3.0, which of the following values is more than 2.5 standard deviations from the mean?

- A. 12.0
- B. 13.5
- C. 17.0
- D. 23.5
- E. 26.5

13. If a certain sample of data has a mean of 20.0 and a standard deviation of 2.0, which of the following pairs contain two values that are each at least 2.5 standard deviations from the mean?

- (A) (14.0; 16.5)
- (B) (14.5; 21.0)
- (C) (14.0; 26.5)
- (D) (16.5; 26.0)
- (E) (21.0; 26.5)

14. Which of the following sets has the standard deviation greater than the standard deviation of set $X = \{-19, -17, -15, -13, -11\}$

I. $A = \{1, 3, 5, 7, 9\}$

II. $B = \{2, 4, 6, 8, 10\}$

III. $C = \{1, -1, -3, -5, -7\}$

- A. Set A only
- B. Set B only
- C. Set C only
- D. Sets A, B and C
- E. None of the sets

15. If d is the standard deviation of x , y , and z , what is the standard deviation of $x + 5$, $y + 5$, $z + 5$?

- A. d
- B. $3d$
- C. $15d$
- D. $d + 5$
- E. $d + 15$

16. The arithmetic mean and standard deviation of a certain normal distribution are 13.5 and 1.5, respectively. What value is exactly 2 standard deviations less than the mean?

- A. 10.5
- B. 11
- C. 11.5
- D. 12
- E. 12.5

17. The standard deviation of a normal distribution of data is 2, and 3 standard deviations below the mean is greater than 43. What is a possible value for the mean of the distribution?

- A. 46
- B. 47
- C. 48
- D. 49
- E. 50

18. Which of the following triples of numbers have the same standard deviation as the numbers r , s , and t ?
- I. $r-2, s-2, t-2$
 - II. $0, r-s, t-s$
 - III. $r-4, s+5, t-1$
- A. I only
 - B. II only
 - C. I and II only
 - D. I and III only
 - E. I, II, and III
19. A certain list of 100 data has an average (arithmetic mean) of 6 and a standard deviation of d , where d is positive. Which of the following pairs of data, when added to the list, must result in a list of 102 data with standard deviation less than d ?
- A. -6 and 0
 - B. 0 and 0
 - C. 0 and 6
 - D. 0 and 12
 - E. 6 and 6
20. A data set with a mean of 60 has a standard deviation of 3.5. Which of the following is the smallest number that falls within one standard deviation of the mean?
- A. 53
 - B. 56
 - C. 59
 - D. 63.5
 - E. 65
21. A certain list has an average of 6 and a standard deviation of d (d is positive). Which of the following pairs of data when added to the list, must result in a list of 102 data with standard deviation less than d ?
- A. (-6;0)
 - B. (0;0)
 - C. (0;6)
 - D. (0;12)
 - E. (6;6)

22. A researcher investigating mosquito populations recorded a list of estimates of mosquito populations at each of 75 different marshland locations in a certain country. The distribution of these estimates was symmetric about the average (arithmetic mean), and 70% of these population estimates were within one standard deviation of the mean. Of these estimates, 75 were more than one standard deviation below the mean. Approximately how many of the estimates were within one standard deviation of the mean?
- A) 175
 - B) 350
 - C) 375
 - D) 425
 - E) 500
23. The table shows the number of calls received by each of five operators during each of 4 one-hour periods. For which operator was the standard deviation of the numbers of calls received during these 4 periods the least?
- A. Operator A: 3, 7, 7, 3
 - B. Operator B: 4, 5, 5, 6
 - C. Operator C: 8, 2, 5, 5
 - D. Operator D: 6, 4, 4, 6
 - E. Operator E: 3, 4, 5, 8
24. Arithmetic mean and standard deviation of a certain normal distribution are 13.5 and 1.5. What value is exactly 2 standard deviations less than the mean?
- (A) 10.5
 - (B) 11
 - (C) 11.5
 - (D) 12
 - (E) 12.5
25. Set X consists of 100 numbers. The average (arithmetic mean) of set X is 10, and the standard deviation is 4.6. Which of the following two numbers, when added to set X, will decrease the set's standard deviation by the greatest amount?
- A. -100 and -100
 - B. -10 and -10
 - C. 0 and 0
 - D. 0 and 20
 - E. 10 and 10

26. A certain set of numbers has an average (arithmetic mean) of 50 and a standard deviation of 50.5. If m and n , two numbers in the set, are both within 2 standard deviations from the average, then which of the following could be the sum of m and n ?

A. -200
B. -130
C. -104
D. 51
E. 305

27. 7.51 8.22 7.86 8.36
8.09 7.83 8.30 8.01
7.73 8.25 7.96 8.53

A vending machine is designed to dispense 8 ounces of coffee into a cup. After a test that recorded the number of ounces of coffee in each of 1000 cups dispensed by the vending machine, the 12 listed amounts, in ounces, were selected from the data above. If the 1000 recorded amounts have a mean of 8.1 ounces and a standard deviation of 0.3 ounces, how many of the 12 listed amounts are within 1.5 standard deviation of the mean?

A. Four
B. Six
C. Nine
D. Ten
E. Eleven

28. The median annual household income in a certain community of 21 households is \$50,000. If the mean income of a household increases by 10% per year over the next 2 years, what will the median income in the community be in 2 years?

(A) \$50,000
(B) \$60,000
(C) \$60,500
(D) \$65,000
(E) Cannot be determined

29. Set A consists of all prime numbers between 10 and 25; Set B consists of consecutive even integers, and set C consists of consecutive multiples of 7. If all the three sets have an equal number of terms, which of the following represents the ranking of these sets in an ascending order of the standard deviation?

(A) C, A, B
(B) A, B, C
(C) C, B, A
(D) B, C, A
(E) B, A, C

30. If a certain sample of data has a mean of 24.0 and the value 31.0 is more than 2.5 standard deviations from the mean, which of the following could be the standard deviation of the sample

- A. 3.75
- B. 3.50
- C. 3.25
- D. 3.00
- E. 2.75

31. For a certain exam, a score of 58 was 2 standard deviations below mean and a score of 98 was 3 standard deviations above mean. What was the mean score for the exam?

- A. 74
- B. 76
- C. 78
- D. 80
- E. 82

32. 9.4 , 9.9 , 9.9 , 9.9 , 10.0 , 10.2 , 10.2 , 10.5

The mean and the standard deviation of the 8 numbers shown above is 10 and 0.3 respectively. What percent of the 8 numbers are within 1 standard deviation of the mean?

- A. 90%
- B. 85%
- C. 80%
- D. 75%
- E. 70%

33. 70 75 80 85 90 105 105 130 130 130

The list shown consist of the times, in seconds, that it took each of 10 school children to run a distance of 400 meter. If the SD of ten running times is 22.4 seconds, rounded to nearest tenth of second, how many of the 10 running times are more than one SD below the mean of the 10 running times?

- A. one
- B. two
- C. three
- D. four
- E. five