F.5 Mathematics

MC Exercise

5B11 Measures of Dispersion II

1. The score of Andy in a written test is 85 marks. If the mean and standard deviation of the test scores are 77 marks and 5 marks respectively, find the standard score of Andy in the test.

A. -1.6
B. -0.625
C. 0.625
D. 1.6

2. The score and standard score of Ivy in a Liberal Studies test are 63 marks and 1.6 respectively. The mean of the test scores is 59 marks. Find the standard deviation of the test scores.

A. 0.4 mark
B. 0.8 mark
C. 1.25 marks
D. 2.5 marks

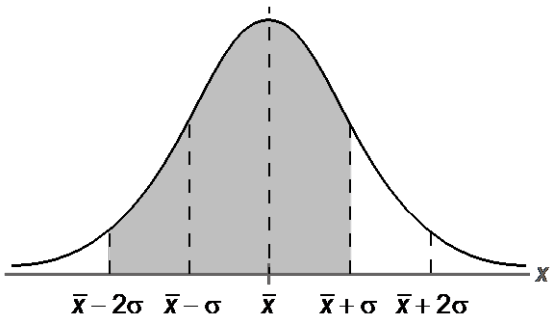
3. The score of Wilson in an examination is 91 and his standard score is 1.4. If the standard deviation of the examination scores is 5, find the mean of the examination scores.

A. 80
B. 84
C. 95
D. 98

4. The standard score of Frankie in a Physics test is 1.1. If the mean and standard deviation of the test scores are 61 and 12 respectively, find the test score of Frankie.

A. 44.5
B. 47.8
C. 74.2
D. 80.3

5. It is given that $\bar{x}$ and σ are the mean and standard deviation of a normal distribution respectively. The following shows the normal curve representing the normal distribution.

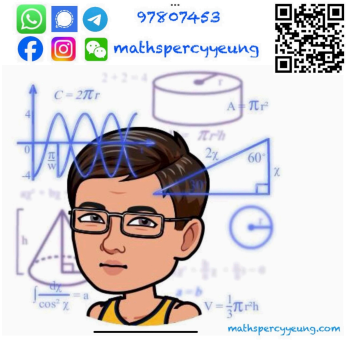


Find the percentage of data in the shaded region. [Assume that 68%, 95% and 99.7% of data fall within $\bar{x}\pm\sigma$, $\bar{x}\pm2\sigma$ and $\bar{x}\pm3\sigma$ respectively.]

A. 68%
B. 81.5%
C. 95%
D. 99.7%

6. It is given that $\bar{x}$ and σ are the mean and standard deviation of a normal distribution respectively. Which of the following is NOT correct? [Assume that 68%, 95% and 99.7% of data fall within $\bar{x}\pm\sigma$, $\bar{x}\pm2\sigma$ and $\bar{x}\pm3\sigma$ respectively.]

A. The median of the distribution is $\bar{x}$.
B. The mode of the distribution is $\bar{x}$.
C. 81.5% of the data fall within the interval $\bar{x}-\sigma$ and $\bar{x}+2\sigma$.
D. 97.25% of the data fall within the interval $\bar{x}-2\sigma$ and $\bar{x}+3\sigma$.



7. It is given that $\bar{x}$ and σ are the mean and standard deviation of a normal distribution respectively. Find the percentage of data below $\bar{x}-2\sigma$ and above $\bar{x}+3\sigma$. [Assume that 68%, 95% and 99.7% of data fall within $\bar{x}\pm\sigma$, $\bar{x}\pm2\sigma$ and $\bar{x}\pm3\sigma$ respectively.]

A. 2.35%
B. 2.65%
C. 97.35%
D. 97.65%

8. The daily sales of a shoe shop in a year are normally distributed with a mean of \$70 125 and a standard deviation of \$1 102. Find the percentage of the daily sales with the amount between \$66 819 and \$69 023. [Assume that 68%, 95% and 99.7% of data fall within $\bar{x}\pm\sigma$, $\bar{x}\pm2\sigma$ and $\bar{x}\pm3\sigma$ respectively.]

A. 13.5%
B. 15.85%
C. 34%
D. 49.85%

9. The mean and standard deviation of the times taken to finish a task are 30 min and 2.5 min respectively. The time taken by Joan is 28 min and the standard score of the time taken by Peter is –0.7. Which of the following must be true?

A. Standard score of the time taken by Joan $=-1.25$
B. The standard score of the time taken by Joan is higher than that taken by Peter.
C. Joan finishes a task more efficiently.
D. None of the above

10. The weights of 720 students are normally distributed, and the mean and standard deviation of the weights are 58 kg and 5 kg respectively. Find the number of students with weights below 68 kg. [Assume that 68%, 95% and 99.7% of data fall within $\bar{x}\pm\sigma$, $\bar{x}\pm2\sigma$ and $\bar{x}\pm3\sigma$ respectively.]

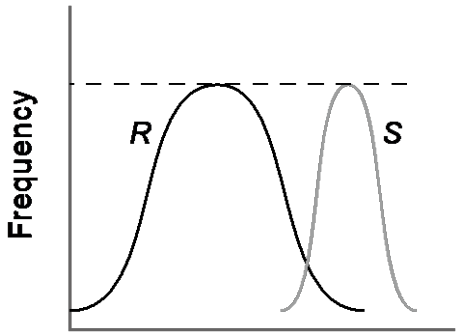
A. 342
B. 490
C. 684
D. 702

11. The following shows the scores and standard scores of Timothy and Zoe in an examination. Find the mean and standard deviation of the examination scores.

	Score	Standard score
Timothy	81	–0.2
Zoe	84	0.4

A. Mean = 78, standard deviation = 15
B. Mean = 80, standard deviation = 5
C. Mean = 82, standard deviation = 5
D. Mean = 83, standard deviation = 5

12. The following shows the normal curves of two normal distributions *R* and *S*.



Which of the following must be true?

I. Mode of *R* = Mode of *S*
II. Median of *R* < Median of *S*
III. Standard deviation of *R* > Standard deviation of *S*

A. I only
B. I and III only
C. II and III only
D. I, II and III

13. If 8 is added to each datum of a set of data, which of the following must be true?

I. The mean increases by 8.
II. The inter-quartile range remains unchanged.
III. The standard deviation remains unchanged.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

14. It is given that the median and inter-quartile range of a set of data are 23 and 11 respectively. If 7 is added to each datum of the set to form a new set of data, find the median and inter-quartile range of the new set of data.

A. Median = 23, inter-quartile range = 11

B. Median = 23, inter-quartile range = 18

C. Median = 30, inter-quartile range = 11

D. Median = 30, inter-quartile range = 18

15. It is given that the inter-quartile range and standard deviation of a set of data are x and y respectively. If a common constant k is added to each datum of the set to form a new set of data, find the inter-quartile range and standard deviation of the new set of data.

A. Inter-quartile range = x, standard deviation = y

B. Inter-quartile range = $x + k$, standard deviation = y

C. Inter-quartile range = x, standard deviation = $y + k$

D. Inter-quartile range = $x + k$, standard deviation = $y + k$

16. It is given that the inter-quartile range and standard deviation of a set of data are x and y respectively. If each datum of the set is multiplied by a positive number k to form a new set of data, find the inter-quartile range and standard deviation of the new set of data.

A. Inter-quartile range = x, standard deviation = y

B. Inter-quartile range = kx, standard deviation = y

C. Inter-quartile range = x, standard deviation = ky

D. Inter-quartile range = kx, standard deviation = ky

17. The median and inter-quartile range of a set of data are a and b respectively. If 5 is added to each datum and then each resulting datum is multiplied by 5 to form a new set of data, find the median and inter-quartile range of the new set of data.

A. Median $= 5a + 5$, inter-quartile range $= 5b$

B. Median $= 5a + 5$, inter-quartile range $= 5b + 25$

C. Median $= 5a + 25$, inter-quartile range $= 5b$

D. Median $= 5a + 25$, inter-quartile range $= 5b + 25$

18. $\{x - 2, x, x + 3, x + 4\}$ and $\{x, x + 2, x + 5, x + 6\}$ are two sets of data. Which of the following must be true?

I. The means of these two sets of data are the same.

II. The ranges of these two sets of data are the same.

III. The standard deviations of these two sets of data are the same.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

19. It is given that the mean and standard deviation of the first set of data $\{x, y, z\}$ are $\bar{x}$ and σ respectively. Find the mean and standard deviation of the second set of data $\{4x + 7, 4y + 7, 4z + 7\}$.

	Mean	Standard deviation
A.	$\bar{x} + 7$	σ
B.	$\bar{x} + 7$	4σ
C.	$4\bar{x} + 7$	4σ
D.	$4\bar{x} + 7$	$4\sigma + 7$

20. $\{a, b, c, d, e\}$ and $\{3a-4, 3b-4, 3c-4, 3d-4, 3e-4\}$ are two sets of data arranged in ascending order. If the mean and standard deviation of the first set of data are $\bar{x}$ and σ respectively, which of the following must be true?

I. These two sets of data have the same range.

II. The mean of the second set of data is $\bar{x}-4$.

III. The standard deviation of the second set of data is 3σ.

A. I only

B. III only

C. I and III only

D. I, II and III

21. For a set of data which are not entirely the same, the mean is 7. If a datum '7' is removed from the set of data, what will be the change in the standard deviation?

A. It will increase.

B. It will decrease.

C. It will remain unchanged.

D. It cannot be determined.

22. For a set of data which are not entirely the same, the mean and standard deviation are 2 and 1 respectively. If a datum '2' is added to the set of data, which of the following must be true?

I. New mean = 4

II. New standard deviation = 1

III. New standard deviation < 1

A. II only

B. III only

C. I and II only

D. I and III only

23. The range and mean of selling prices of watches in a shop are \$750 and \$1 600 respectively. If 4 watches with selling prices of \$1 600 each are sold, what are the effects on the range and standard deviation of selling prices of watches in the shop?

	Range	Standard deviation
A.	cannot be determined	will increase
B.	cannot be determined	will decrease
C.	will remain unchanged	will increase
D.	will remain unchanged	will decrease

24. For a set of nine data, the mean and standard deviation are 10 and 4 respectively. When seven data are added and all of them are 10, find the mean and standard deviation of the new set of data.

A. Mean $=10$, standard deviation $=3$

B. Mean $=10$, standard deviation $=4$

C. Mean $=10$, standard deviation $=\frac{16}{3}$

D. Mean $=\frac{160}{9}$, standard deviation $=\frac{64}{9}$