

4.E: Z-scores and the Standard Normal Distribution (Exercises)

1. What are the two pieces of information contained in a z -score?

Answer:

The location above or below the mean (from the sign of the number) and the distance in standard deviations away from the mean (from the magnitude of the number).

2. A z -score takes a raw score and standardizes it into units of _____.
3. Assume the following 5 scores represent a sample: 2, 3, 5, 5, 6. Transform these scores into z -scores.

Answer:

$\bar{X} = 4.2$, $s = 1.64$; $z = -1.34, -0.73, 0.49, 0.49, 1.10$

4. True or false:
 - a. All normal distributions are symmetrical
 - b. All normal distributions have a mean of 1.0
 - c. All normal distributions have a standard deviation of 1.0
 - d. The total area under the curve of all normal distributions is equal to 1
5. Interpret the location, direction, and distance (near or far) of the following z -scores:
 - a. -2.00
 - b. 1.25
 - c. 3.50
 - d. -0.34

Answer:

- a. 2 standard deviations below the mean, far
 - b. 1.25 standard deviations above the mean, near
 - c. 3.5 standard deviations above the mean, far
 - d. 0.34 standard deviations below the mean, near
6. Transform the following z -scores into a distribution with a mean of 10 and standard deviation of 2: -1.75, 2.20, 1.65, -0.95
 7. Calculate z -scores for the following raw scores taken from a population with a mean of 100 and standard deviation of 16: 112, 109, 56, 88, 135, 99

Answer:

$z = 0.75, 0.56, -2.75, -0.75, 2.19, -0.06$

8. What does a z -score of 0.00 represent?
9. For a distribution with a standard deviation of 20, find z -scores that correspond to:
 - a. One-half of a standard deviation below the mean
 - b. 5 points above the mean
 - c. Three standard deviations above the mean
 - d. 22 points below the mean

Answer:

- a. -0.50
 - b. 0.25
 - c. 3.00
 - d. 1.10
10. Calculate the raw score for the following z -scores from a distribution with a mean of 15 and standard deviation of 3:
 - a. 4.0

- b. 2.2
- c. -1.3
- d. 0.46

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