5.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:

$\overline{X}$= 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
