

1. What information is provided by the sign (+/-) of a z-score? What information is provided by the numerical value of the z-score?

2. A distribution has a standard deviation of $\sigma = 10$. Find the z-score for each of the following locations in the distribution.

- a. Above the mean by 5 points.
- b. Above the mean by 2 points.
- c. Below the mean by 20 points.
- d. Below the mean by 15 points.

3. For a distribution with a standard deviation of $\sigma = 20$, describe the location of each of the following z-scores in terms of its position relative to the mean. For example, $z = +1.00$ is a location that is 20 points above the mean.

- a. $z = +2.00$
- b. $z = +0.50$
- c. $z = -1.00$
- d. $z = -0.25$

4. For a population with $\mu = 80$ and $\sigma = 10$, find the z-score for each of the following X values.

(Note: You should be able to find these values using the definition of a z-score. You should not need to use a formula or do any serious calculations.)

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| $X = 75$ | $X = 100$ | $X = 60$ |
| $X = 95$ | $X = 50$ | $X = 85$ |

- b. Find the score (X value) that corresponds to each of the following z-scores. (Again, you should not need a formula or any serious calculations.)

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| $z = 1.00$ | $z = 0.20$ | $z = 1.50$ |
| $z = -0.50$ | $z = -2.00$ | $z = -1.50$ |

5. For a population with $\mu = 40$ and $\sigma = 11$, find the z-score for each of the following X values. (Note: You probably will need to use a formula and a calculator to find these values.)

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| $X = 45$ | $X = 52$ | $X = 41$ |
| $X = 30$ | $X = 25$ | $X = 38$ |

6. For a population with a mean of $\mu = 100$ and a standard deviation of $\sigma = 20$, find the z-score for each of the following X values.

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| $X = 108$ | $X = 115$ | $X = 130$ |
| $X = 90$ | $X = 88$ | $X = 95$ |

- b. Find the score (X value) that corresponds to each of the following z-scores.

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| $z = -0.40$ | $z = -0.50$ | $z = 1.80$ |
| $z = 0.75$ | $z = 1.50$ | $z = -1.25$ |

7. A population has a mean of $\mu = 60$ and a standard deviation of $\sigma = 12$.

- a. For this population, find the z-score for each of the following X values.

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| $X = 69$ | $X = 84$ | $X = 63$ |
| $X = 54$ | $X = 48$ | $X = 45$ |

- b. For the same population, find the score (X value) that corresponds to each of the following z-scores.

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| $z = 0.50$ | $z = 1.50$ | $z = -2.50$ |
| $z = -0.25$ | $z = -0.50$ | $z = 1.25$ |

8. A sample has a mean of $M = 30$ and a standard deviation of $s = 8$. Find the z-score for each of the following X values from this sample.

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| $X = 32$ | $X = 34$ | $X = 36$ |
| $X = 28$ | $X = 20$ | $X = 18$ |

9. A sample has a mean of $M = 25$ and a standard deviation of $s = 5$. For this sample, find the X value corresponding to each of the following z-scores.

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| $z = 0.40$ | $z = 1.20$ | $z = 2.00$ |
| $z = -0.80$ | $z = -0.60$ | $z = -1.40$ |

10. Find the z-score corresponding to a score of $X = 45$ for each of the following distributions.

- a. $\mu = 40$ and $\sigma = 20$
- b. $\mu = 40$ and $\sigma = 10$
- c. $\mu = 40$ and $\sigma = 5$
- d. $\mu = 40$ and $\sigma = 2$

11. Find the X value corresponding to $z = 0.25$ for each of the following distributions.

- a. $\mu = 40$ and $\sigma = 4$
- b. $\mu = 40$ and $\sigma = 8$
- c. $\mu = 40$ and $\sigma = 16$
- d. $\mu = 40$ and $\sigma = 32$

12. A score that is 6 points below the mean corresponds to a z-score of $z = -2.00$. What is the population standard deviation?

13. A score that is 9 points above the mean corresponds to a z-score of $z = 1.50$. What is the population standard deviation?

14. For a population with a standard deviation of $\sigma = 12$, a score of $X = 44$ corresponds to $z = -0.50$. What is the population mean?

15. For a sample with a standard deviation of $s = 8$, a score of $X = 65$ corresponds to $z = 1.50$. What is the sample mean?

16. For a sample with a mean of $M = 51$, a score of $X = 59$ corresponds to $z = 2.00$. What is the sample standard deviation?