

Z-Scores, Proportions, and Percentiles

1. A normal distribution of scores has a standard deviation of 10. Find the z-scores corresponding to each of the following values:
 - a) A score that is 20 points above the mean.
 - b) A score that is 10 points below the mean.
 - c) A score that is 15 points above the mean
 - d) A score that is 30 points below the mean.
2. For each z-score below, find the percentile (percent of individuals scoring at or below):
 - a) $z = -0.47$
 - b) $z = 2.24$
3. For each z-score below, find the proportion of cases falling above the z:
 - a) $z = 0.24$
 - b) $z = -2.07$
4. For each z-score below, find the area between the mean and the z-score:
 - a) $z = 1.17$
 - b) $z = -1.37$
5. A patient recently diagnosed with Alzheimer's disease takes a cognitive abilities test and scores a 45. The mean on this test is 52 and the standard deviation is 5. What is the patient's percentile?
6. A fifth grader takes a standardized achievement test (mean = 125, standard deviation = 15) and scores a 148. What is the child's percentile?

7. Pat and Chris both took a spatial abilities test (mean = 80, std. dev. = 8). Pat scores a 76 and Chris scored a 94. What proportion of individuals would score between Pat and Chris?
8. The Welcher Adult Intelligence Test Scale is composed of a number of subtests. On one subtest, the raw scores have a mean of 35 and a standard deviation of 6. Assuming these raw scores form a normal distribution:
- What proportion of raw scores are between 28 and 38?
 - What proportion of raw scores are between 41 and 44?
 - What number represents the 65th percentile (what number separates the lower 65% of the distribution)?
 - What number represents the 90th percentile?
9. Scores on the SAT form a normal distribution with $\mu = 500$ and $\sigma = 100$.
- What is the minimum score necessary to be in the top 15% of the SAT distribution?
 - Find the range of values that defines the middle 80% of the distribution of SAT scores.
10. For a normal distribution, find the z-score that separates the distribution as follows:
- Separate the highest 30% from the rest of the distribution.
 - Separate the lowest 40% from the rest of the distribution.
 - Separate the highest 75% from the rest of the distribution.