Z-Score, 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:
   a) What proportion of raw scores are between 28 and 38?

   b) What proportion of raw scores are between 41 and 44?

   c) What number represents the 65th percentile (what number separates the lower 65% of the distribution)?

   d) What number represents the 90th percentile?

9. Scores on the SAT form a normal distribution with $\mu = 500$ and $\sigma = 100$.
   a) What is the minimum score necessary to be in the top 15% of the SAT distribution?

   b) 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:
   a) Separate the highest 30% from the rest of the distribution.

   b) Separate the lowest 40% from the rest of the distribution.

   c) Separate the highest 75% from the rest of the distribution.