

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. $z=2$
 - b) A score that is 10 points below the mean. $z=-1$
 - c) A score that is 15 points above the mean $z=1.5$
 - d) A score that is 30 points below the mean. $z=-3$

2. 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 number represents the 65th percentile (what number separates the lower 65% of the distribution)? 37.31
 - b) What number represents the 90th percentile? 42.71
 - c) What is the probability of getting a raw score between 28 and 38? 57%
 - d) What is the probability of getting a raw score between 41 and 44? 9%

3. 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? 604

 - b) Find the range of values that defines the middle 80% of the distribution of SAT scores (372 and 628). **Find the z-scores - -1.28, 1.28**

4. 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. $.52$
 - b) Separate the lowest 40% from the rest of the distribution. $.25$
 - c) Separate the highest 75% from the rest of the distribution. $-.67$

5. For the numbers below, find the area between the mean and the z-score:
- a) $z = 1.17$.38
 - b) $z = -1.37$.41
6. For the z-scores below, find the percentile rank (percent of individuals scoring below):
- a) -0.47 31.9 Percentile
 - b) 2.24 98.8 Percentile
7. For the numbers below, find the percent of cases falling above the z-score:
- a) 0.24 41%
 - b) -2.07 98%
8. 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 rank? 8.1%
9. A fifth grader takes a standardized achievement test (mean = 125, standard deviation = 15) and scores a 148. What is the child's percentile rank? 94%
10. Pat and Chris both took a spatial abilities test (mean = 80, std. dev. = 8). Pat scores a 76 and Chris scored a 94. What percent of individuals would score between Pat and Chris? 65%
11. 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 of 60, where the mean score of the sample data values is 40. $Z=2$
 - b) A score that is 30 points below the mean. $z=-3$
 - c) A score of 80, where the mean score of the sample data values is 30. $Z=5$

d) A score of 20, where the mean score of the sample data values is 50. $Z=-3$

12. IQ scores have a mean of 100 and a standard deviation of 16. Albert Einstein reportedly had an IQ of 160.

a. What is the difference between Einsteins IQ and the mean? **60**

b. How many standard deviations is that? **3.75**

c. Convert Einstein's IQ score to a z score. $(160 - 100)/16 = 3.75$

d. If we consider "usual IQ scores to be those that convert z scores between -2 and 2, is Einstein's IQ usual or unusual? **Unusual**

13. Women's heights have a mean of 63.6 in. and a standard deviation of 2.5 inches. Find the z score corresponding to a woman with a height of 70 inches and determine whether the height is unusual. $Z = (70 - 63.6)/2.5 = 2.56$

14. Three students take equivalent stress tests. Which is the highest relative score (meaning which has the largest z score value)? **C has the highest z - score**

a. A score of 144 on a test with a mean of 128 and a standard deviation of 34. **.47**

b. A score of 90 on a test with a mean of 86 and a standard deviation of 18. **.22**

c. A score of 18 on a test with a mean of 15 and a standard deviation of 5. **.6**