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Z-Scores – Day 3

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. 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 65^{th} percentile (what value separates the lower 65% of the distribution)?

   b. What number represents the 90^{th} percentile?

   c. What is the probability of getting a raw score between 28 and 38?

   d. What is the probability of getting a raw score between 41 and 44?

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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?

   b. Find the range of values that defines the middle 80% of the distribution of SAT scores.

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.

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

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

5. For the numbers below, find the area between the mean and the z-score:
   a. z = 1.17 b. z = -1.37

6. For the z-scores below, find the percentile rank (percent of individuals scoring below):
   a. -0.47 b. 2.24

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7. For the numbers below, find the percent of cases falling above the z-score:
   a. 0.24
   b. -2.07

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?

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?

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?

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.

    b. A score that is 30 points below the mean.

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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 Einstein's IQ and the mean?

    b. How many standard deviations is that?

    c. Convert Einstein's IQ score to a z score.

    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?

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.

14. Three students take equivalent stress tests. Which is the highest relative score (meaning which has the largest z score value)?
    a. A score of 144 on a test with a mean of 128 and a standard deviation of 34.

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

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