

Normal Distribution/Empirical Rule/Z-Scores Definitions and Concepts

1. Determine the median and mean of the following data sets and describe if the distribution would be approximately normal, skewed left, or skewed right.

- a. 12, 11, 15, 13, 28, 9, 33
 median: 13
 mean: 17.3
 skewed right
- b. 70, 65, 75, 72, 65, 71, 69
 median: 70
 mean: 69.6
 approximately normal
- c. 88, 90, 80, 92, 87, 2, 66
 median: 87
 mean: 72.1
 skewed left

2. Why is the Empirical Rule sometimes referred to as the “68-95-99.7 rule”?

The Empirical Rule states that if a distribution is approximately normal, 68%, 95%, 99.7% of the data falls within 1, 2, and 3 standard deviations of the mean, respectively.

3. In words, describe what a z-score represents.

A Z-score represents how many standard deviations a data point is from the mean.

4. If $z = 2.21$, is our x value on the left or right of a normal distribution? What if $z = -6.68$?

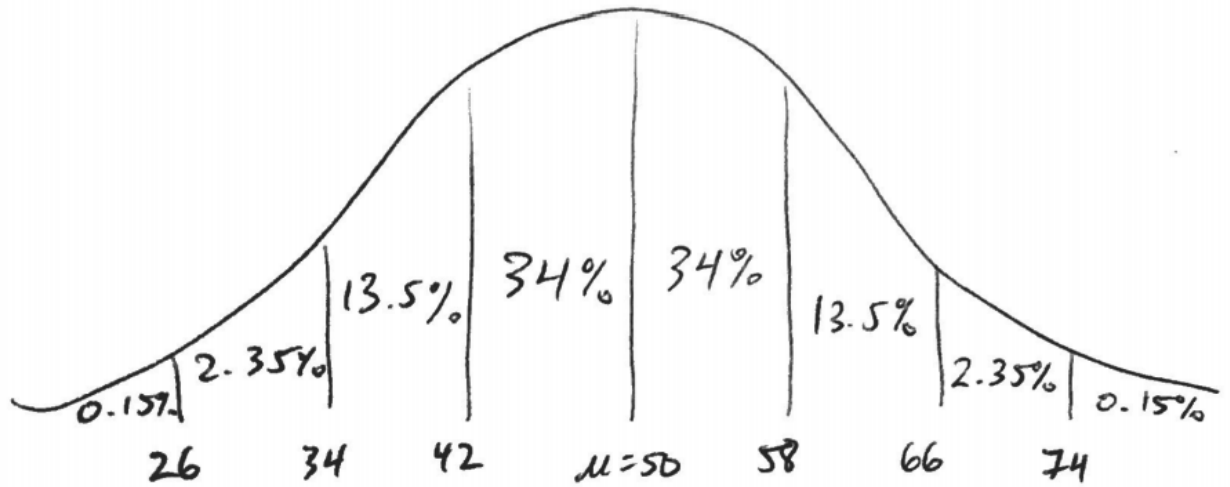
$z = 2.21 \Rightarrow x$ is on the right

$z = -6.68 \Rightarrow x$ is on the left

5. If we obtain a z-score and look it up on a z table, does the number we get from the table represent the area under a normal curve to the left of our z-score, the probability of getting an x value to the left of our z-score, or are those two options identical?

The two options are identical.

6. Draw a normal curve with $\mu=50$ and $\sigma=8$, including the numbers at ± 1 , ± 2 , and ± 3 standard deviations from the mean and the percentages under the curve between standard deviations.



7. If $\mu=88$, $\sigma=15$, and $z=1.12$, what x value gave us that z -score? Start by stating the z -score formula.

$$z = \frac{x - \mu}{\sigma} = \frac{x - 88}{15} = 1.12$$

solving for x gives us $x = 104.8$

8. If $z = 3.29$, without looking at a z table, do you think the area to the right of this z value will be very large or very small?

Very small.

9. Without looking at a z -table, which of the following would be larger:

- a. The percentage to the left of $z = -1.02$ or to the right of $z = 2.01$?

Left of $z = -1.02$

- b. The percentage to the right of $z = -2.57$ or to the left of $z = 0.41$?

Right of $z = -2.57$

- c. The percentage to the left of $z = 2.89$ or to the left of $z = -3.07$?

Left of $z = 2.89$