

5.3.1: Practice Using the z Table

It's time to practice with the z-table!

✓ Example 5.3.1.1

Find the z -score that bounds the *top* 9% of the distribution.

Solution

Because we are looking for *top* 9%, we need to look for the p -value closest to $p = .91000$ ($100\% - 9\% = 91\%$) because the p -values (probabilities) in the z Table show the probability of score being lower, but this question is asking for top 9%, not the portion lower than 9%. There should be 91% of scores lower than the top 9%.

The closest p -value to $p = .91000$ (91%) is 0.90988. The z -score for $p = 0.90988$ is $z=1.34$.

The z -score for the *top* 9% of the distribution is $z=1.34$ (for $p=0.90988$, the closest probability to 91%, which marks everyone lower than the top 9%).

Your turn!

? Exercise 5.3.1.1

Find the z -score that bounds 25% ($p=0.25000$) of the *lower* tail of the distribution.

Hint: You don't have to subtract anything for this one because the question is asking about the scores that are *lower*.

Answer

The z -score for 25% of the lower tail of the distribution is $z = -0.67$ (for $p=0.25143$, the closest probability to 0.25000 (25%)).

Now, let's try some scenarios...

✓ Example 5.3.1.2

The heights of women in the United States are normally distributed with a mean of 63.7 inches and a standard deviation of 2.7 inches. If you randomly select a woman in the United States, what is the probability that she will be between taller than 64 inches?

Solution

X (raw score) = 64 inches

\bar{X} = 63.7 inches

$s=2.7$ inches

$$z = \frac{x - \bar{X}}{s} = \frac{64 - 63.7}{2.7} = \frac{0.30}{2.7} = 0.11$$

Finding $z=0.11$ on the z Table, we see that $p = 0.543860$. This is the probability that a score will be lower than our raw score, but the question asked the proportion who would be taller.

$$1 - 0.54380 = 0.4562$$

$$p \times 100 = 0.4562 \times 100 = 45.62\%$$

Final Answer (in words): The probability that a woman in the U.S. would be 64 inches or taller is 0.4562, or 45.62%

Your turn!

? Exercise 5.3.1.2

The heights of men in the United States are normally distributed with a mean of 69.1 inches and a standard deviation of 2.9 inches. What proportion of men are taller than 6 feet (72 inches)?

Answer

Final Answer: The probability that a man in the U.S. would be 72 inches or taller is 0.15866, or 15.87%

Last one, on something that you might find relevant!

? Exercise 5.3.1.3

Imagine that you scored 82 points on a final exam. After the final, you find out that the average score on the exam was 78 with a standard deviation of 7. What proportion (in a percentage) did worse than you (earned a *lower* score)?

Answer

The proportion of students in the class who did worse than you (earned a *lower* score) should be 71.57%

Contributors and Attributions

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