

PSYCH 10 · Fall 2026 · Worksheet for Lecture 7: z-scores and the normal curve · Answer key

The answers are in blue. Where a question has more than one defensible answer, the key says so and describes what a good answer contains.

Part 1 · How many SDs from the mean?

In the NHANES survey, adult women's heights have a mean of 64 inches and an SD of 3 inches, rounded to whole inches. Men's heights have a mean of 69 inches and an SD of 3 inches.

a. Taylor Swift is 5 ft 10 in, or 70 inches. How many SDs above the women's mean is 70 inches? Show your arithmetic.

a. $(70 - 64) / 3 = 6 / 3 = 2$: Taylor Swift is two SDs above the women's mean.

b. How many SDs from the men's mean is a man of 70 inches?

b. $(70 - 69) / 3 = 1 / 3 \approx 0.3$: a 5 ft 10 in man is close to the men's mean.

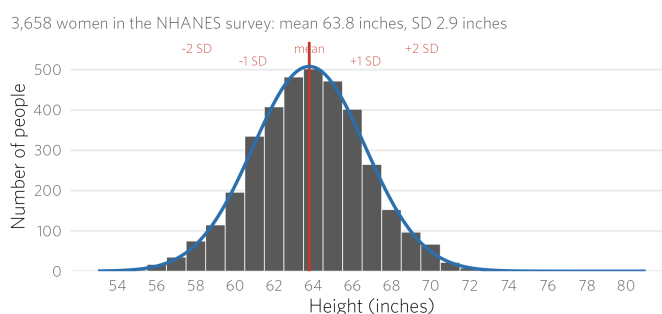
c. What is the z-score of a woman who is 61 inches tall (5 ft 1 in)?

c. $(61 - 64) / 3 = -1$.

d. What do the sign of a z-score (whether it is positive or negative) and its size each tell you about the value?

d. The sign says which side of the mean the value is on: minus for below, plus for above. The size says how far from the mean the value is, in SDs: a z-score of -1 is one SD below the mean. A z-score has no units, since it is inches divided by inches, and the mean itself has a z-score of 0.

Part 2 · The normal curve



The curve over the histogram is the **normal curve** with the same mean and SD as the data. Under the normal curve, 68% of the area is within 1 SD of the mean, 95% within 2 SDs, and 99.7% within 3 SDs.

a. On the figure, shade the region within 1 SD of the mean, from 61 to 67 inches, and write the curve's percentage inside the shaded region.

a. The shaded region runs from 61 to 67 inches, with "68%" written inside it.

b. According to the curve, about what percentage of women are taller than 67 inches?

b. About $(100 - 68) / 2 = 16\%$ of women.

c. Taylor Swift's height, 70 inches, is 2 SDs above the mean. According to the normal curve, about what percentage of women are that tall or taller?

c. About 2.5%. The curve puts 95% of women within 2 SDs of the mean, so 5% are outside, half of them above: $(100 - 95) / 2 = 2.5\%$.

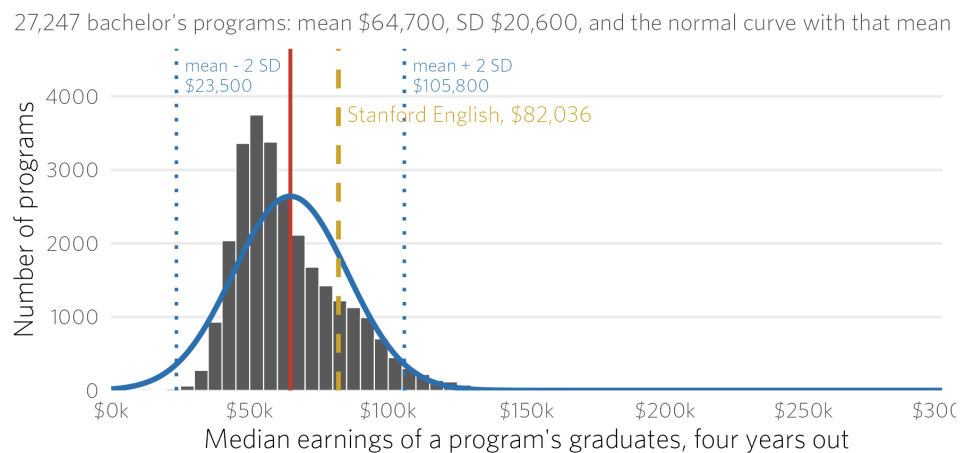
d. In the survey, 71% of the women are between 61 and 67 inches. Is that close to the curve's figure for the same range?

d. Yes. The curve puts 68% of women within 1 SD of the mean and the survey has 71% between 61 and 67 inches, three

percentage points apart. For heights, the curve is a close description of the data.

Part 3 • Does the curve fit?

Last Wednesday's New York Times guide listed, for every major at every college, the median earnings of the program's graduates four years after graduation: 27,247 programs in all. The histogram shows all of them, with the normal curve that has the same mean and SD, about \$65,000 and \$20,000.



a. For women's heights, the normal curve followed the histogram. Describe one way this histogram differs from its curve.

a. *A long right tail: the programs are bunched between about \$40,000 and \$70,000 and trail off far to the right, past \$200,000, while almost none fall below \$25,000. The curve is symmetric, so it puts programs in a left tail that is nearly empty in the data and too few in the right tail. Any one of these differences is a full answer.*

b. The normal curve puts 2.5% of programs above \$105,000 (two SDs above the mean) and 2.5% below \$25,000 (two SDs below). In the data, about 1,100 of the 27,247 programs are above \$105,000 and about 25 are below \$25,000. What percentage of the programs is in each tail, and is each larger or smaller than the curve's 2.5%?

b. *Above: 1,100 of 27,247 is about 4%, more than the curve's 2.5%. Below: 25 of 27,247 is about 0.1%, far fewer than the curve's 2.5%. The right tail holds more programs than the curve's share and the left tail far fewer, so the curve misses in both directions.*

c. Across the 27,247 programs, the mean is about \$65,000 and the median about \$60,000. Why are they \$5,000 apart here, when for women's heights the mean and the median are both 64 inches?

c. *The long right tail pulls the mean up while the median stays with the bulk of the programs, as the one high salary did to the seven salaries last Wednesday. Women's heights have no such tail, so their mean and median are the same value, 64 inches.*