Z-scores review

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What are z-scores?

A z-score measures exactly how many standard deviations above or below the mean a data point is.

Here's the formula for calculating a z-score:

$$z = \frac{\text{data point} - \text{mean}}{\text{standard deviation}}$$

Here's the same formula written with symbols:

$$z = \frac{x - \mu}{\sigma}$$

Here are some important facts about z-scores:

- A positive z-score says the data point is above average.
- A negative z-score says the data point is below average.
- A z-score close to 0 says the data point is close to average.
- A data point can be considered unusual if its z-score is above 3 or below -3. *[Really?]*

Want to learn more about z-scores? Check out [this video](.).

Example 1

The grades on a history midterm at Almond have a mean of $\mu = 85$ and a standard deviation of $\sigma = 2$.

Michael scored 86 on the exam.

Find the z-score for Michael's exam grade.

$$z = \frac{\text{his grade} - \text{mean grade}}{\text{standard deviation}}$$

$$z = \frac{86 - 85}{2}$$

$$z = \frac{1}{2} = 0.5$$

Michael's z-score is 0.5. His grade was half of a standard deviation above the mean.

Example 2

The grades on a geometry midterm at Almond have a mean of $\mu = 82$ and a standard deviation of $\sigma = 4$.

Michael scored 74 on the exam.

Find the z-score for Michael's exam grade.

$$z = \frac{\text{his grade} - \text{mean grade}}{\text{standard deviation}}$$

$$z = \frac{74 - 82}{}$$

$$z = \frac{}{4}$$
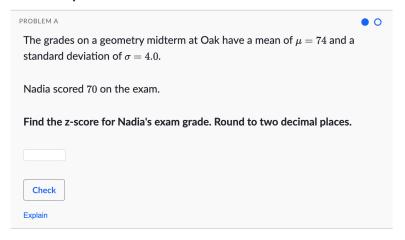
$$z = \frac{-8}{4} = -2$$

Michael's z-score is -2. His grade was two standard deviations below the mean.

Practice problems

The grades on a geometry midterm at Oak have a mean of $\mu = 74$ and a standard deviation of $\sigma = 4.0$.

Nadia scored 70 on the exam.

Find the z-score for Nadia's exam grade. Round to two decimal places.

[ ]

Check

Explain

Want to practice more problems like these? Check out [this exercise](#).

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