

Choosing whether to use normalcdf or invNorm

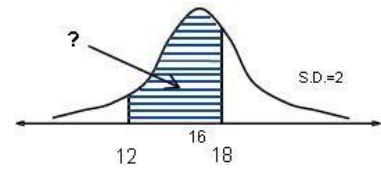
- The area under the normal bell curve can represent either a probability, or a percentage.
- Use the normalcdf function to find the area under the curve when two "bounds" are known.
- On Texas Instrument graphing calculators, press 2nd then VARS select 2:normalcdf
- 4 entries, separated by commas, are required; the lower bound, the upper bound, the mean, and the standard deviation

Example 1

The lengths of adult carp in a lake are normally distributed with a mean length of 16 inches and a standard deviation of 2 inches. What percent of the adult carp in the lake are between 12 and 18 inches in length? Sketch a bell curve. Note the mean in the middle for a reference point. Label the relevant lower bound and the upper bound. Shade the relevant area under the curve.

$$\text{Normalcdf}(12, 18, 16, 2) = 0.8185946784$$

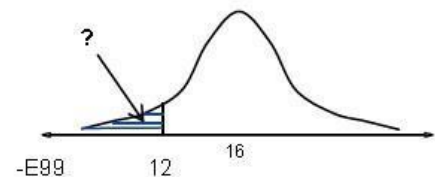
Approximately 82% of the adult carp in the lake are between 12 and 18 inches long. **Example 2**



What percent of the adult carp in the lake are less than 12 inches in length? Sketch a bell curve. Note the mean in the middle for a reference point. Label the relevant lower bound and the upper bound. Shade the relevant area under the curve.

$$\text{Normalcdf}(-E99, 12, 16, 2) = 0.022750062.$$

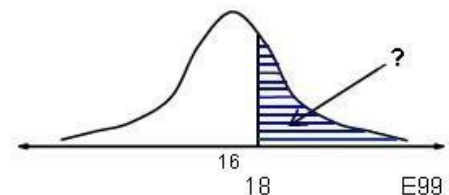
Approximately 2.3% of the adult carp in the lake are less than 12 inches long. **Example 3**



What percent of the adult carp in the lake are at least 18 inches in length? Sketch a bell curve. Note the mean in the middle for a reference point. Shade the relevant area under the curve. Label the lower bound and the upper bound of the shaded region.

$$\text{Normalcdf}(18, E99, 16, 2) = 0.1586552596.$$

Approximately 16% of the adult carp in the lake are at least 18 inches long.

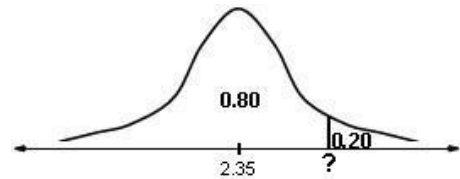


The invNorm function

- The area under the normal bell curve can represent either a probability, or a percentage.
 - Use the invNorm function to find the number line value when the area under the curve to the left of that value is known.
 - On Texas Instrument graphing calculators, press 2nd then VARS select 3:invNorm
 - 3 entries, separated by commas, are required – the area under the bell curve that lies to the left of the unknown number line value, the mean, and the standard deviation
- ### Example 1

Graduating seniors at a certain high school with GPAs in the top 20% are eligible for a special college scholarship. Grade point averages for seniors at that high school are normally distributed with a mean of 2.35 and a standard deviation of 0.15. What is the minimum grade point average that a senior at that school must have in order to qualify for the scholarship?

Sketch a bell curve and note the median on the number line for a reference point. Recall that the median separates the top 50% from the bottom 50%. Values and percentiles increase from left to right.



Draw a vertical line at the right end and denote the top 20% as 0.20 Use subtraction to determine the area to the left of the vertical line. Label this bottom 80% under the curve as 0.80.

$\text{InvNorm}(0.80, 2.35, 0.15) = 2.476243185$ A senior must have a grade point average of at least 2.48 to qualify for the scholarship.

Example 2

Find the critical values, Z , for a 95% confidence interval for a population mean. Recall that the sample mean falls exactly in the center of the confidence interval. Sketch a bell curve on a number line. Note the sample mean on the number line for a reference point. Draw two vertical lines to denote the middle 95%.

Use subtraction and division to determine the area in each tail. $0.05 \div 2 = 0.025$

Recall that for the z-distribution the mean is 0 and the standard deviation is 1.

$\text{InvNorm}(0.025, 0, 1) = -1.9599$ because of symmetry, the critical values for a 95% confidence interval are ± 1.96 . Remember - When using invNorm, enter the total area to the left of the unknown number line value!

