examples

confidence interval (for one mean)

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The General Social Survey asks: "For how many days during the past 30 days was your mental health, which includes stress, depression, and problems with emotions, not good?" Based on responses from 1,151 US residents, the survey reported a 95% confidence interval of 3.40 to 4.24 days in 2010. Interpret this interval in context of the data.

We are 95% confident that Americans on average have 3.40 to 4.24 bad mental health days per month.

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In this context, what does a 95% confidence level mean?

95% of random samples of 1,151 Americans will yield CIs that capture the true population mean of number of bad mental health days per month.

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Suppose the researchers think a 99% confidence level would be more appropriate for this interval. Will this new interval be narrower or wider than the 95% confidence interval?

As CL increases so does the width of the confidence interval, so wider.

A sample of 50 college students were asked how many exclusive relationships they've been in so far. The students in the sample had an average of 3.2 exclusive relationships, with a standard deviation of 1.74. In addition, the sample distribution was only slightly skewed to the right. Estimate the true average number of exclusive relationships based on this sample using a 95% confidence interval.

$n = 50$

$\bar{x} = 3.2$

$s = 1.74$

1. random sample & 50 < 10% of all college students

We can assume that the number of exclusive relationships one student in the sample has been in is independent of another.

2. $n > 30$ & not so skewed sample

We can assume that the sampling distribution of average number of exclusive relationships from samples of size 50 will be nearly normal.

Heart: http://commons.wikimedia.org/wiki/File:Heart-padlock.svg

$n = 50$

$\bar{x} = 3.2$

$s = 1.74$

$$SE = \frac{s}{\sqrt{n}} = \frac{1.74}{\sqrt{50}} \approx 0.246$$

$$\bar{x} \pm z^* \, SE = 3.2 \pm 1.96\,(0.246)$$

$$= 3.2 \pm 0.48$$

$$= (2.72, 3.68)$$

We are 95% confident that college students on average have been in 2.72 to 3.68 exclusive relationships.