Need to prepare samples of 5 scores for each group (from Psysc 101 class with mean 81.5

randNorm(81.5, 7, 5)

σ

5 scores randomly selected from this Normal Distribution.

Will tell the calculator to choose a SRS of 15 scores

mean[randNorm(M, 20, 16)] =

will find the sample mean.

Ch. 8 Estimating with Confidence

This chapter begins the formal study of statistical inference.

continue after Winter break

Have your textbook handy

Ch. 8

BASICS OF CONFIDENCE INTERVALS

ESTIMATE A Population Proportion

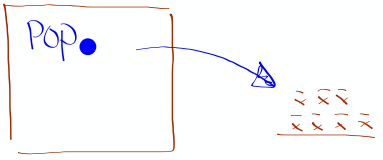
p

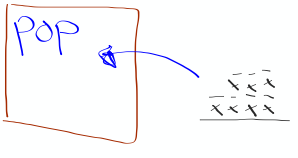
ESTIMATE A Population Mean

μ

How is this chapter different than Chapter 7?

In Chapter 7, we pretended to know the truth about a population and asked questions about what could happen in a sample. In this chapter, we begin with information about a sample (more likely in real life) and ask questions about the population.





Mystery Mean

an activity that should give you an idea of what lies ahead.

Your team will try to estimate the mystery value of the population mean, μ,

for a

final exam for a Psychology 101 final

Lesson 8.1: Day 1: Guess the Mystery Mean

Today, you will be making your best guess at the mean Final Exam score of a Psychology 101 class by creating a ***confidence interval*** (*point estimate* ± *margin of* error). The group who creates a confidence interval with the smallest margin of error that still captures the true mean exam score will win a prize!

1. Mr. Cedarlund will give your group a random sample of 5 scores. Record the 5 scores and then find the mean.

   Scores:_____

   Mean:_____. This is your ***point estimate*** for the true mean.

2. Identify the population, parameter, sample, and statistic.

   Population:_____ Parameter:_____

   Sample:_____ Statistic:_____

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   Population: All scores from Psych. 101 Parameter: μ true mean score

   Sample: 5 scores from sample Statistic: $\bar{x}$ mean of samples

3. Now you are going to change your *point estimate* into an interval of values by adding and subtracting the same number from your *point estimate* (the number you add and subtract is called your **margin of error.**) What margin of error will you choose? Why?

4. Write your interval that you think contains the true mean midterm exam score.

   (? ?)

5. How confident do you feel that your interval captures the true mean? Answer with a percentage.

The True mean

81.5%

Whose interval captured the true mean average?

Smallest Margin of error?

Learning Targets for section 8.1

- ✓ IDENTIFY an appropriate point estimator and CALCULATE the value of a point estimate.
- ✓ INTERPRET a confidence interval in context.
- ✓ DETERMINE the point estimate and margin of error from a confidence interval.
- ✓ USE a confidence interval to MAKE a decision about the value of a parameter.

6. One of the groups got (71, 79) as their interval. What was their point estimate? What was their margin of error?

Point Estimate = Margin of error =

7. One group claims that the true mean exam score is 84. Does your interval support or deny this claim? Why?

6. One of the groups got (71, 79) as their interval. What was their point estimate? What was their margin of error?

Point Estimate $= \frac{79+71}{2} = 75$ Margin of error $= \frac{79-71}{2} = 4$

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yes, 84 is within my interval

OR No, 84 is not within my interval

Lesson 8.1 Day 1– The Idea of a Confidence Interval

Important ideas:

Point Estimator

Confidence Intervals

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Statistic that provides a reasonable guess about the popul. parameter.

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MOE = $\frac{B-A}{2}$

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We are ___% confident that the interval from A to B captures the true ~~Parameter~~ context of parameter

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Interpretation

We are ___% confident that the interval from A to B captures the true Parameter of context

A confid. interval gives PLAUSIBLE values,

Check Your Understanding

The **Pew Research Center and *Smithsonian*** magazine recently quizzed a random sample of 1006 U.S. adults on their knowledge of science. One of the questions asked, "Which gas makes up most of the Earth's atmosphere: hydrogen, nitrogen, carbon dioxide, or oxygen?" A 95% confidence interval for the proportion who would correctly answer nitrogen is 0.175 to 0.225.

1. Interpret the confidence interval.

Knowledge of Science

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1. Interpret the confidence interval.

We are 95% confident that the interval from 0.175 to 0.225 captures the true proportion of U.S. adults who would answer correctly.

2. Calculate the point estimate and the margin of error.

AP® Exam Tip

When interpreting a confidence interval, make sure that you are describing the parameter and not the statistic.

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2. Calculate the point estimate and the margin of error.

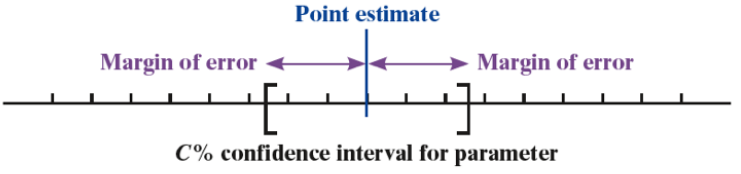
Pt. Est. $= \frac{.175 + .225}{2} = 0.2$

Marg of Error $= \frac{.225 - .175}{2} = .025$

The Idea of a Confidence Interval

To create an interval of plausible values for a parameter, we need two components: a point estimate to use as the midpoint of the interval and a **margin of error** to account for sampling variability.

Confidence Interval = point estimate ± margin of error



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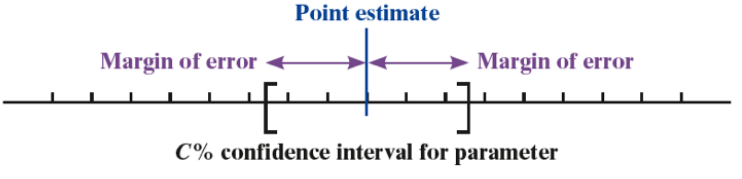

for Confidence interval (A, B):

$$P.E. = \frac{A+B}{2} \qquad M.O.E. = \frac{B-A}{2}$$

3. If people guess one of the four choices at random, about 25% should get the answer correct. Does this interval provide convincing evidence that less than 25% of all U.S. adults would answer this question correctly? Explain your reasoning.

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All of the plausible values are less than 25%. Therefore the interval does give convincing evidence that less than 25% of all US adults would answer correctly.

What is a point estimator? What is a point estimate?

Estimator: is a _____

Point estimator: is a statistic that provides a _____ guess of a population parameter.

Point estimate: A single best guess for the value of a _____ parameter.

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Do you get enough sleep?

Identify the point estimator you would use to estimate the parameter in each of the following settings and calculate the value of the point estimate.

(a) A counselor at a large high school wants to estimate the mean amount of sleep μ that students got the previous night. She selects a random sample of 10 students and asks them to record the number of hours they slept last night. Here are the results:
4 5 5.5 6 6 7 7 7.5 8 10

Point Estimator:

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Point Estimator: Use the sample mean, $\bar{x}$, as a point estimator for the pop mean, μ.

The point estimate is

$$\bar{x} = \frac{4+5+5.5+\dots+10}{10} = 6.6 \text{ hours}$$

(b) It is recommended that high school students get 8 hours or more of sleep each night, so the counselor wants to estimate the proportion p of all students at this large high school who got the recommended amount of sleeping time.

Point Estimator:

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Point Estimator:

Use the sample proportion $\hat{p}$ as the point estimator for p

The point estimate = PE is $\hat{p} = \frac{2}{10} = 0.2$

(c) The counselor also wants to investigate the variability in sleep times by estimating the population standard deviation σ.

Point Estimator:

(c) The counselor also wants to investigate the variability in sleep times by estimating the population standard deviation σ.

Point Estimator: Use sample std deviation S_x

P.E. is $S_x = 1.696$ hours

~~$\sigma_x =$~~

from GDC
1-Variable Stat

$S_x = \sqrt{\frac{(x-\bar{x})^2}{n-1}}$

8.1 .... 1-9 (odds) , 27

study pp. 495-499

be sure to read pp.496-498!!!