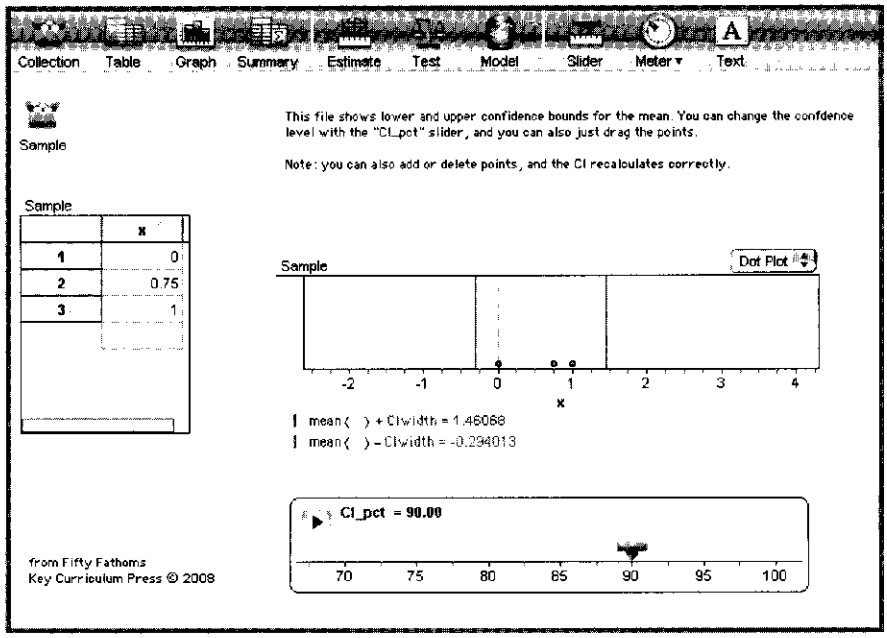
Demo 34: Exploring the Confidence Interval of the Mean

How the CI depends on individual values

This demo gives you a chance to see (or show) dynamically how the confidence interval changes as you change the data values, the confidence level, and the number of points. Its purpose is to help you get a "feel" for confidence intervals rather than to reveal their deeper meaning (for example, in Demo 35, "Capturing the Mean with Confidence Intervals").



What To Do

- Open **CI of the Mean.ftm.** It will look like the illustration.
- Pick a point on the graph and drag it. You'll see the confidence interval update in real time. Rescale the axes when you need to. Pay attention to how moving a point changes the width of the interval.
- Drag a dashed rectangle around all of the points to select all three. Then drag one to move them all in parallel. See how the width of the interval does not change.
- See if you can arrange the points so that the interval does not include zero.
- See if you can arrange the points so that one of them is outside the interval.
- The **CI_pct** slider controls the "confidence level" of the interval, in percent. It begins as a 90% confidence interval; change it to the traditional 95%. Then just drag the slider value around and see what happens.

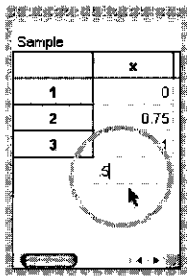
Questions

1. When you move all three points in parallel, what happens to the interval?
2. When you move just one point, what happens to the interval?
3. What seems to determine the width of the interval?
4. Where are the points when the interval does not include zero? **Sol**
5. When you make the confidence level higher with the slider, what happens to the interval?

Extension

We've been looking at a sample of size three; let's add a point.

- In the case table at the left of the window, type a new value, as shown, in the empty box at the bottom and press **Enter** or **Return.** The number should be about the same size as the current data values.



- Redo the steps above with four cases instead of three.
- Add cases as you wish.
- To remove a case, select it by clicking on it once in the graph or in the case table, then choose **Delete Case** from the **Edit** menu.

Challenges

6 Find two arrangements of points, as different as possible, that have the same confidence interval.

7 Getting a point outside the CI is hard with three points. Figure out what has to be true for that to occur. **Sol**

8 Getting a point outside the CI is relatively easy with four points. Figure out what has to be true to make that hard (or even impossible).