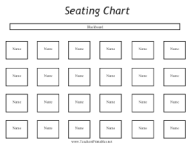
Name: _____ Hour: _____ Date: _____

Does seat location matter? Part 1



Do students who sit in the front rows do better than students who sit farther away? A teacher randomly assigned 30 students to seats at the beginning of the semester and then recorded their exam scores at the end of the semester. Here are the results:

Row	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3
Score	76	77	94	99	88	90	83	85	74	79	77	79	90	88	68	78	83	79

Row	4	4	4	4	4	4	5	5	5	5	5	5
Score	94	72	101	70	63	76	76	65	67	96	79	96

1. Is this an observational study or an experiment? Why?

2. Why is it important to randomly assign students to seats rather than letting them choose their own seat?

3. How many variables are we measuring?_____ Are they categorical or quantitative?_____

What is the explanatory variable (x)?_____ Response variable(y)?_____

4. Use www.stapplet.com or your calculator to make a scatterplot. Sketch it below.

5. Find the least squares regression line (LSRL):_____

6. What is the slope of the LSRL:_____ Interpret the slope in the context of the problem.

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Does the negative slope provide convincing evidence that sitting in a lower row causes higher exam scores, or is it plausible that the association is purely by chance because of random assignment?

In order to answer this question, we need to know more about "purely by chance because of random assignment". If we assume that seat location has NO effect on exam score, then we could just randomly assign all 30 exam scores to each of the seat locations. We will do this by writing down each of the 30 exam scores onto an index card, shuffle the index cards, and then randomly assign them to seat locations.

Shuffle up the note cards and randomly assign 6 students into each of the 5 rows. Record the results:

Row 1: _____, _____, _____, _____, _____, _____
Row 2: _____, _____, _____, _____, _____, _____
Row 3: _____, _____, _____, _____, _____, _____
Row 4: _____, _____, _____, _____, _____, _____
Row 5: _____, _____, _____, _____, _____, _____ Now find the slope of the LSRL:_____

Repeat this process 2 more times for a total of 3 different random assignments. Record the results.

Row 1: _____, _____, _____, _____, _____, _____
Row 2: _____, _____, _____, _____, _____, _____
Row 3: _____, _____, _____, _____, _____, _____
Row 4: _____, _____, _____, _____, _____, _____
Row 5: _____, _____, _____, _____, _____, _____ Now find the slope of the LSRL:_____

Row 1: _____, _____, _____, _____, _____, _____
Row 2: _____, _____, _____, _____, _____, _____
Row 3: _____, _____, _____, _____, _____, _____
Row 4: _____, _____, _____, _____, _____, _____
Row 5: _____, _____, _____, _____, _____, _____ Now find the slope of the LSRL:_____

You have now calculated three different possible values for the slope based on random assignment. Take these 3 values to the dotplot on the whiteboard in the front of the room. When everyone in class has recorded their data, copy the dotplot below:

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Inference for Slope: Introduction

Important ideas:

Check Your Understanding

Mrs. Barrett's class did a fun experiment using paper helicopters. After making 70 helicopters using the same template, students randomly assigned 14 helicopters to each of five drop heights: 152 cm, 203 cm, 254 cm, 307 cm, and 442 cm.

Teams of students released the 70 helicopters in a random order and measured the flight times in seconds. The class used computer software to carry out a least-squares regression analysis for these data. Some output from this regression analysis is shown here. We checked conditions for performing inference earlier.

Regression Analysis: Flight time versus Drop height

Predictor	Coef	SE Coef	T	P
Constant	−0.03761	0.05838	−0.64	0.522
Drop height (cm)	0.0057244	0.0002018	28.37	0.000

S = 0.168181 R-Sq = 92.2% R-Sq(adj) = 92.1%

(a) What is the estimate for α? Interpret this value.

(b) What is the estimate for β? Interpret this value.

(c) What is the estimate for σ? Interpret this value.

(d) Give the standard error of the slope SE_b. Interpret this value.