STA 674

Regression Analysis And Design Of Experiments

Fitting Simple Linear Regression Models – Lecture 10

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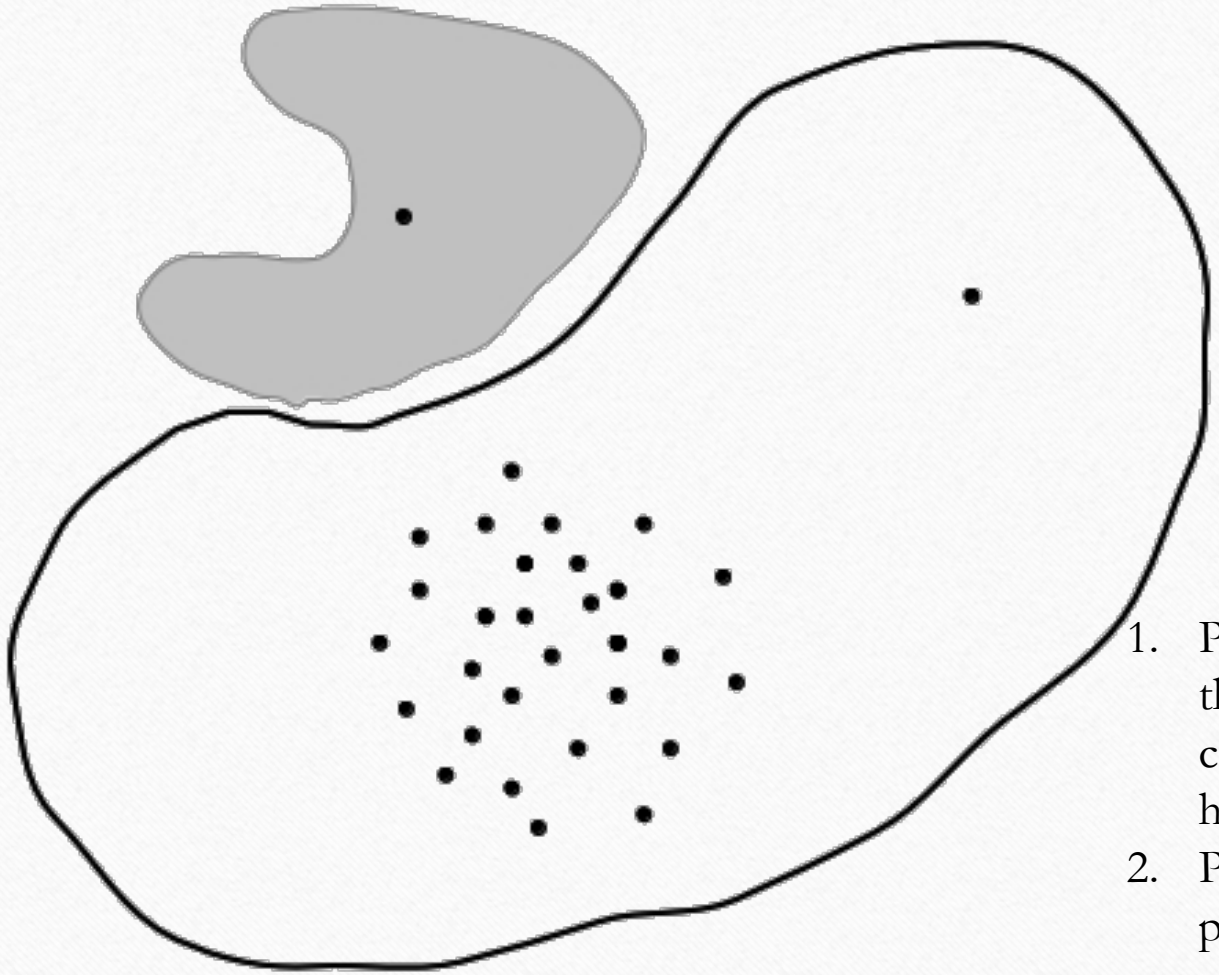
- Last time: we carried out significance (or hypothesis) testing for the population slope in a linear regression setting
- This time: prediction—with precision!



1. Put an "X" where you think the hole is, and draw a "95% confidence region" for the hole.
2. Put an "X" (different color, perhaps) where you think his next shot will go, and draw a "95% confidence region for that shot.

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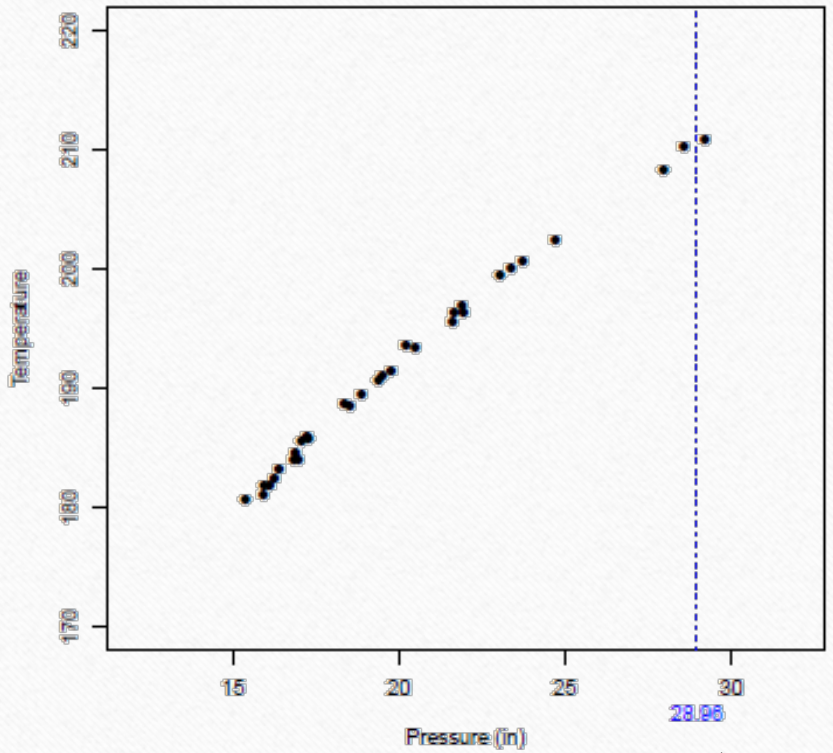
Example: Hooker's data

Questions:

1. What is the average boiling point for all cities at the same pressure as Lexington (28.96 in)?
2. What is the boiling point for Lexington?
3. What is an interval for each of these values that we feel "95% confident" of success?



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"Same" question: given a new value of the explanatory variable, x_j:

- What is the most likely value of the conditional mean $\mu_{y|x_j}$? - or –
- What is the most likely value of a new observation at x_j?

These questions are answered with the linear model...a single point on the regression line

Different questions: given a new value of the explanatory variable, x_j:

- What is a plausible range of values for $\mu_{y|x_j}$?
- What is a plausible range of values for a new observation at x_j?

Questions answered by the degree of precision

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These different questions: given a new value of the explanatory variable, x_j:

- What is a plausible range of values for $\mu_{y|x_j}$?

  (Still) called a **confidence interval for $\mu_{y|x_j}$**

- What is a plausible range of values for a new observation at x_j?

  This is called a **prediction interval for y at x_j**