Class Notes

this time: Statistical Models for Means & Percentages, Inference
next time: Significance Testing
- reading: FPP ch. 26

[CS 10 continued]

Inferential Summary

<table>
<thead>
<tr>
<th>Quantity of Interest</th>
<th>( \bar{x} ) = mean of money owed on all avg bills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>( \bar{x} = $28.09 )</td>
</tr>
<tr>
<td>Give or Take</td>
<td>( \hat{SE}(\bar{x}) = \frac{\hat{r}}{n} ) (or ( \hat{SE}(\bar{x}) = \frac{\sigma}{\sqrt{n}} ))</td>
</tr>
<tr>
<td>95% Confidence Interval</td>
<td>( \bar{x} \pm 2\hat{SE}(\bar{x}) ) = ($26.71, $29.47)</td>
</tr>
</tbody>
</table>

Long Run Histogram of \( \bar{x} \):

95% chance that \( \mu \) & \( \bar{x} \) will differ by no more than \( 2\hat{SE} = \$1.38 \). This suggest the interval (\$26.71, \$29.47). Neyman (1930) called this the 95% "confidence interval" (CI) for \( \mu \).

It is a good bet that \( \bar{x} \) is between this interval.

Q: Does this mean that \( P(26.71 \leq \mu \leq 29.47) = 95\% \) in relative frequency approach to a problem?

A: No, unfortunately \( \mu \) is a fixed unknown constant (parameter) which either is or is not in (\$26.71, \$29.47). If \( \mu \) is in range, \( P_c = 100\% \). If not, \( P_c = 0\% \).

[Diagram showing a normal distribution with 95% confidence interval]
For F: ① About 68% of the raw bills in the sample are in the range $28.09 \pm $0.69.
   A: False, correct SD would be about $31.40.
② About 68% of the raw bills in the population are in the range $28.09 \pm $0.69.
   A: False, truth is $28.09 \pm 31.40$. 0.69 is how far you can expect $x$ to differ from $\mu$. 