This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike License. Your use of this material constitutes acceptance of that license and the conditions of use of materials on this site.
Lecture 3g: Practice Problem Solutions

John McGready
Johns Hopkins University
1. Suppose a study is done to estimate the proportion of patients who suffer from nausea as a side effect from taking a drug, Drug A. Suppose a random sample of 200 users of Drug A is taken, and each individual in the sample is queried about the presence/absence of nausea. In the study, 90 of the 200 subjects report some nausea since starting the Drug A regimen.

a) Estimate a 95% confidence interval, by hand, for the true proportion of subjects with nausea amongst everyone taking Drug A.

Here, \( \hat{p} = \frac{90}{200} = 0.45 \). Using the formula \( \hat{p} \pm 2 \times \sqrt{\frac{\hat{p} \times (1 - \hat{p})}{n}} \)

\[ \begin{align*}
\hat{p} \pm 2 \times \sqrt{\frac{0.45 \times 0.55}{200}} & \rightarrow 0.45 \pm 2 \times 0.035 \\
& \rightarrow (0.38, 0.52) \text{ or } (38\%, 52\%).
\end{align*} \]
1. (Continued)

How does the interval in part a compare to the exact confidence interval computed by Stata?

```
cii 200 90
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200</td>
<td>.45</td>
<td>.0351781</td>
<td>.3797536 .5217507</td>
</tr>
</tbody>
</table>
2. Data was from a 2004 random sample of 960 high school students in Haifa, Israel to look at the association between post-traumatic stress induced by terrorist attacks/threat and substance abuse.\(^1\) Two of the findings from this study are that 35% knew at least one person who had been killed in a terrorist attack and that 10% of the sample had used marijuana in the 30 days prior to the study.

- Estimate a 95% confidence intervals, by hand, for the proportion of all HS students in Haifa in 2004 who:
  - Knew at least one person killed in a terrorist attack
  - Had used marijuana in the prior 30 day period

2. (Continued)
   a) Estimate a 95% confidence intervals, by hand, for the proportion of all HS students in Haifa in 2004 who:
      ▶ Knew at least one person killed in a terrorist attack
      ▶ Here $\hat{p} = .35$, and since there were 960 students surveyed, $.35 \times 960 = 336$ student respondents said they knew at least one person killed in a terrorist attack.
      ▶ Using the formula $\hat{p} \pm 2 \times \sqrt{\frac{\hat{p} \times (1-\hat{p})}{n}}$ yields:

\[
0.35 \pm 2 \times \sqrt{\frac{0.35 \times 0.65}{960}} \rightarrow 0.35 \pm 2 \times 0.015 \rightarrow
\]

$(0.32, 0.38)$ or $(32\%, 38\%)$.

2. (Continued)
   a) Estimate a 95% confidence intervals, by hand, for the proportion of all HS students in Haifa in 2004 who:
      ▶ Had used marijuana in the prior 30 day period

      ▶ Here $\hat{p} = .10$, and since there were 960 students surveyed, $.10 \times 960 = 96$ student respondents said they had used marijuana in the prior 30 day period

      ▶ Using the formula $\hat{p} \pm 2 \times \sqrt{\frac{\hat{p} \times (1 - \hat{p})}{n}}$ yields:

         \[ 0.10 \pm 2 \times \sqrt{\frac{0.10 \times 0.90}{960}} \rightarrow 0.10 \pm 2 \times 0.01 \rightarrow \]

         \( (0.08, 0.12) \) or \( (8\%, 12\%) \).

Practice Problems

2. (Continued)
   b) How do the intervals in part A compare to the exact confidence intervals computed by Stata?

   . cii 960 336

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>-- Binomial Exact --</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>960</td>
<td>.35</td>
<td>.0153941</td>
<td>.3198066  .381117</td>
</tr>
</tbody>
</table>

   . cii 960 96

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>-- Binomial Exact --</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>960</td>
<td>.1</td>
<td>.0096825</td>
<td>.0817519  .1207426</td>
</tr>
</tbody>
</table>