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Lecture 3g: Practice Problem Solutions

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Practice Problems

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 $\hat{p} \pm 2 \times \sqrt{\frac{\hat{p} \times (1 - \hat{p})}{n}}$

– yields $0.45 \pm 2 \times \sqrt{\frac{0.45 \times .55}{200}} \rightarrow 0.45 \pm 2 \times 0.035 \rightarrow$
 $(0.38, 0.52)$ or $(38\%, 52\%)$.

Practice Problems

1. (Continued)

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

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. cii 200 90
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Variable	Obs	Mean	Std. Err.	-- Binomial Exact -- [95% Conf. Interval]	
	200	.45	.0351781	.3797536	.5217507

Practice Problems

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

Notes: ¹ Schiff, M., et al. (2007). Exposure to terrorism and Israeli youths' cigarette, alcohol, and cannabis use. *American Journal of Public Health* 97, 10.

Practice Problems

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:

$$0.35 \pm 2 \times \sqrt{\frac{0.35 \times .65}{960}} \rightarrow 0.35 \pm 2 \times 0.015 \rightarrow$$

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

Practice Problems

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:

$$0.10 \pm 2 \times \sqrt{\frac{0.10 \times .90}{960}} \rightarrow 0.10 \pm 2 \times 0.01 \rightarrow (0.08, 0.12) \text{ or } (8\%, 12\%).$$

Practice Problems

2. (Continued)

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

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. cii 960 336
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Variable	Obs	Mean	Std. Err.	-- Binomial Exact -- [95% Conf. Interval]	
	960	.35	.0153941	.3198066	.381117

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. cii 960 96
```

Variable	Obs	Mean	Std. Err.	-- Binomial Exact -- [95% Conf. Interval]	
	960	.1	.0096825	.0817519	.1207426

Notes: ¹ Schiff, M., et al. (2007). Exposure to terrorism and Israeli youths' cigarette, alcohol, and cannabis use. *American Journal of Public Health* 97, 10.