

## Section 9.1 IRA

### *Introduction*

Screen 1: Remember that a parameter describes a population, while a statistic describes a sample. [Section 1.1]

Screen 2: This questions is about the sampling techniques from Chapter 1. You can look back to the pointers from Sections 1.3 & 1.4 to go over these techniques.

Screen 3: z-sub-alpha is the notation for finding the z-value that has an area of alpha to the right of it. For example, if you wanted to find z sub 0.38, open the normal calculator in StatCrunch and leave the mean as 0 and standard deviation as 1. Select the >= sign, type 0.38 in the right-hand box, and press compute to find the z-value. [Section 7.2]

Screen 4: I removed this problem, so you should see a blank screen here.

Screen 5: List of Objectives

### ***Objective 1 – Point Estimate for a Population Proportion***

Screen 1: The point estimate for a population proportion  $p$  is the sample proportion  $\hat{p} = \frac{x}{n}$ .

Screen 2: Read through Example 1, which shows how to compute the sample proportion  $\hat{p}$ .

Screen 3: This problem is based on Example 1 on the previous screen.

### ***Objective 2 – Confidence Intervals for Population Proportions***

Screen 1: Explanation about why we need interval estimates, not just point estimates.

Screen 2: More about the importance of intervals.

Screen 3: Explanation of a confidence interval [point estimate +/- margin of error], as well as the level of confidence. If we are creating 95% confidence intervals we would expect 95% of all those intervals to contain the population parameter and 5% to miss it.

Screen 4: The most important material on this screen are the conditions that are required for making confidence intervals for a population proportion. First,  $np(1-p)$  must be at least 10 so the distribution is bell shaped. Second, the sample size cannot be more that 5% of the population size – which can be restated as  $20n$  must be less than or equal to  $N$ .

Screen 5: Do not worry about finding z-values, as StatCrunch handles all of that for us. However, this screen will help you understand how those limits are found.

Screen 6: This exercise is based on the idea that 90% of all 90% confidence intervals will contain the unknown population proportion and the other 10% will not.

**You only get one attempt at this problem, so be sure you understand before submitting an answer.**

Screen 7: This screen reinforces the ideas in the exercise on the previous screen.

Screen 8: Click the link to open Activity 1. This activity is very important. It will show you why the interpretations on the previous screens make sense (like 90% of all 90% confidence intervals will contain the unknown population proportion).

Screen 9: This exercise is based on the interpretation of the last few screens. When constructing many “A”% confidence intervals, we know that approximately “A”% of the intervals contain the unknown population proportion.

If a 95% confidence interval does not contain the population proportion, then the sample proportion is more than **1.96** standard deviations from the mean.

**You only get one attempt at this problem, so be sure you understand before submitting an answer.**

Screen 10: One last time – what does the “95% confidence level” mean? Watch the Caution video.

Screen 11: We will use StatCrunch for this, so breeze through this screen.

Screen 12: These critical values & tail areas may be useful for some homework problems, but we will use StatCrunch for these sorts of calculations.

Screen 13: One more time – how to interpret the level of confidence. The sentence we use to summarize the interval is VERY important. Be sure to watch the “In Other Words” video. (How do you like my voiceovers?)

Screen 14: Example 2 shows how to interpret the results from a 95% confidence interval. Be sure to read through this one.

Screen 15: This is a common misinterpretation of a confidence interval. It shows up as a wrong answer in many multiple choice questions.

Screen 16: Conditions that are required to construct a confidence interval for a population proportion.

1) Make sure that  $n\hat{p}(1 - \hat{p}) \geq 10$ , or the distribution is not normally distributed.

2) Multiply the sample size by 20, and verify that the population is at least that large. ( $20n \leq N$ )

Screen 17: Example 3 shows how to check the conditions and how to make a confidence interval. Be sure to watch the StatCrunch video.

Screen 18: This exercise is based on Example 3 on the previous screen. Be sure to use StatCrunch to make the interval in part b.

Screen 19: The formula for margin of error E is given, but we will get this from StatCrunch. When you use StatCrunch to make the interval you can find the margin of error by subtracting “Upper Limit – Sample Proportion”.

Screen 20: Example 4 shows how to compute the margin of error E. Watch the StatCrunch video to learn how to do it using StatCrunch. In addition to the method listed above on screen 19, you can also compute it using “(Upper Limit – Lower Limit) / 2”.

Screen 21: This screen explains that an increase in the sample size produces a decrease in the margin of error.

Screen 22: You can skip over this activity.

Screen 23: This is based on the activity I just told you to skip. **The correct answer is “less than”.**  
**You only get one chance at this problem, so be sure to enter “less than” as the answer.**

***Objective 3 – Finding Appropriate Sample Size***

Screen 1: Watch the video to get the background for this type of problem – trying to figure out how large of a sample we need. Don’t worry about the formula – we will be using StatCrunch here.

Screen 2: Thanks to StatCrunch you can skip over these formulas.

Screen 3: Example 5 shows how to find the appropriate sample size. Be sure to watch the StatCrunch video. It explains how to find  $n$  when an estimate or the proportion (like 10%) is given, and when there is no estimate of the target proportion given (use 0.5 in this case).

Screen 4: This exercise is based on Example 5 on the previous screen. USE STATCRUNCH.

Screen 5: End of Section