ECO220Y: Homework 10

Required Exercises: Chapter 10: 1, 3, 21, 27, 29, 30, 41, 43, 46, 53

Required Problems:

(1) In Lecture 7 we saw that 5.21% of the Canadian population aged 25 – 54 was unemployed in 2012.

(a) Graph the sampling distribution of the sample proportion unemployed for a random sample of size 40.

(b) Graph the sampling distribution of the sample proportion unemployed for a random sample of size 400.

(c) Graph the sampling distribution of the sample proportion unemployed for a random sample of size 2,000.

(d) Suppose that the sample proportion came out to be 5% unemployed. What is the chance of such a low unemployment rate? Give three different answers corresponding to the circumstances in parts **(a)**, **(b)**, and **(c)**. Review your answers. Without doing further calculations, how would your answer change for a random sample of size 4,000?

(e) Suppose that the sample proportion came out to be 2.5% unemployed. What is the chance of such a low unemployment rate? Give three different answers corresponding to the circumstances in parts **(a)**, **(b)**, and **(c)**. Why is the probability for $n = 2{,}000$ so tiny?

(f) Graphically describe the *distribution of the sample* for part **(d)**.

(g) Graphically describe the *distribution of the sample* for part **(e)**.

(2) Recall the parking permit example in Lecture 10. A sample size of n = 3 is proposed. In the entire population:

Number of Permits	**Fraction of Households**
0	0.4
1	0.4
2	0.2

(a) Do all the steps to derive the sampling distribution of the *sample median*.

(b) Graph of the sampling distribution of the sample median. Explain what the graph shows.

(c) What is the mean (expected value) of the sample median? S.d. of the sample median? Interpret these.

(d) Compare the sampling distribution of the median with the sampling distribution of the mean in Lecture 10. In this example, which sample statistic is more affected by sampling error: the sample mean or median?

(e) A fundamental concept in ECO220Y is using random samples to make inferences about entire populations. Doesn't this homework problem have things backward: it starts with full information about the population (the table above) and uses that to figure out how sampling error will affect a sample statistic (the sample median)?

(f) Explain why solving this problem with the same methods you used in the previous parts would be ridiculous if the sample size were 30 instead of 3 or if the town allowed each resident to have up to five permits.

(3) Researchers routinely ignore the continuity correction. When samples sizes are large, it makes little difference. Hence, as per common practice, the solutions to this homework, like the solutions to the textbook exercises in Chapter 10, have been computed without doing the continuity correction when using the Normal approximation. However, you should understand how to do the continuity correction if it is specifically requested. Consider finding the probability of getting a sample proportion *as big as* 0.60 in a random sample of 200 observations if the population proportion is 0.55.

(a) *Use the continuity* correction to find the requested probability.

(b) Find the requested probability ignoring the continuity correction.