WEEK 8 REPORT – PROBABILITY AND SAMPLING DISTRIBUTIONS

Group Number: 25
Date and Time of Tutorial Session: Wednesday 4:00 – 5:30 pm
Group Members (First and Last name – no student numbers):

1. Asin, Hanna
2. Fraser, Katarzyna
3. Pustil, Ella
4. Tran, Annika

Graded out of 10 marks.

1. What shape should the *sampling distribution* for Facebook friends approach with repeated sampling? Why will the *sampling distribution* take the shape that it does? (1 mark)

When repeatedly drawing samples from a large population and calculating the mean for each sample, the sampling distribution of the sample means will often resemble a normal distribution due to the central limit theorem. This is because if the sample size is large enough, it will take on a normal distribution as it is a more accurate representation. Therefore, we would expect that as we increase the sample size and the number of samples, the shape of the sampling distribution will look more normal.

2. What did the shape of your Facebook friends sampling distribution look like with n=10? What do you notice about the mean of the sampling distribution? (1 mark)

The Facebook friends sampling distribution closely resembles a normal distribution as expected. Additionally, we noticed that the mean of the sampling distribution remained the same at 32.9

3. What are the single elements that make up: i) the *population distribution* of the Facebook data, and ii) the *sampling distribution* of the Facebook data? (hint: what is n=1 for each distribution in the simulation?) (1 mark)

i) Population distribution: An individual Facebook user

ii) Sampling distribution: A single sample of user information

4. The *sampling distributions* from sampling n=10 and n=40 people on Facebook differ in the amount of variation. Explain in detail why this happens given that the standard deviation of the *population distribution* must be the same for both sampling distributions (i.e., both sampling distributions were created using the same population data). Be mindful of the terms 'standard deviation' versus 'standard error'. For a complete answer, refer to the formula for standard error that you have learned about.
(2 mark)

When the sample size increases from 10 to 40, the denominator in the formula increases, which results in a smaller value for the standard error.

$SE=\frac{sd}{\sqrt{n}}$, sd is standard deviation of population and n is sample size.

5. Compare the distributions of the Facebook friends data and the Geyser data.
(2 marks)

a. Describe the similarities and/or differences between these two population distributions.

The two are different as the population distribution of Geyser is bimodal showing two separate groups in the graph where Facebook is unimodal, a large amount of the population is concentrated at a lower frequency.

b. Describe the *sampling distributions* of these two datasets, relative to their *population distributions*. Does the shape of the population distribution affect the shape of the sampling distribution?

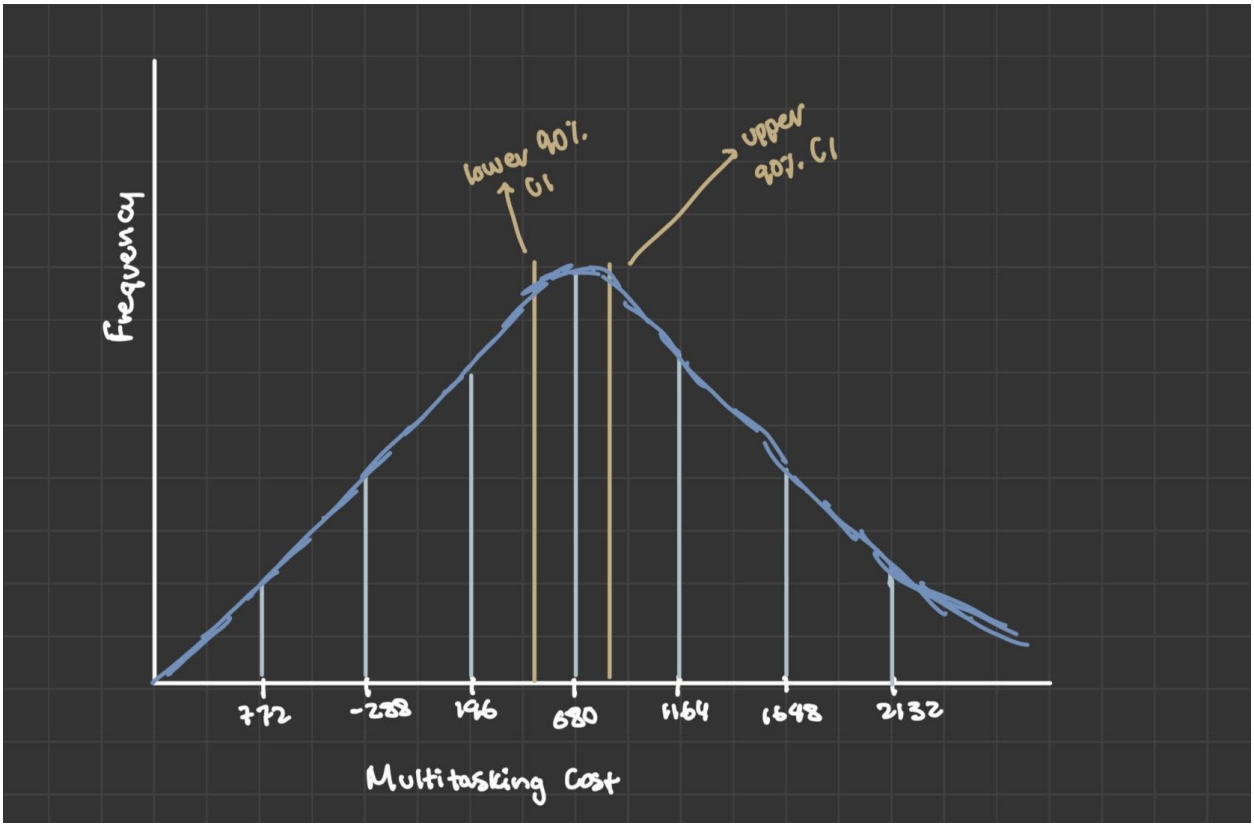
They do not affect each other, doing many samples will always come to a single bell curve because the curve will always center around the mean to the central limit theorem.

6. Report the following values for one of the samples collected by your group.
(1 mark)

	Multitasking Sampling Distribution (n=20)
Your sample mean	662.764
Your sample sd	506.0272
Standard Error of sampling distribution	113.1511
Estimated mean of sampling distribution	662.764
Lower 90% CI	467.1107
Upper 90% CI	858.4174

7. Include a rough sketch of your hypothesized sampling distribution (remember to label your x- and y-axes!). Include your estimated mean and upper and lower confidence interval values.

(1 mark)



8. Calculate the true population mean for the full multitasking dataset (i.e., the full population). Does the confidence interval that you calculated above include the true population mean.
(1 mark)

The true population mean is 716.6066 and the confidence interval does include the true population mean.

Notes:

- **Only one group member submits the report**
- **The report must be a Word .DOC, .DOCX or .PDF file**
- **Make sure everyone in the group has a copy of the report**
- **Double check what you have submitted!!**
  - **view it on OnQ to make sure everything is there and visible**
- **Lastly, everyone in the group needs to submit their own version of the Excel file.**