Problem Set - 1

ECO 204 (Section 2)
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Problem Set Due : 1st Nov, 2022

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§. Problems when we know Population Standard Deviation σ

1. A simple random sample of 40 items resulted in a sample mean of 25 . The population standard deviation is $\sigma = 5$.
   (a) What is the standard error of the mean, $\sigma_{\bar{x}}$?
   (b) At 95% confidence, what is the margin of error?

2. A simple random sample of 50 items from a population with $\sigma = 6$ resulted in a sample mean of 32. Provide a 90% confidence interval, 95% confidence interval and 99% confidence interval for the population mean.

3. A simple random sample of 60 items resulted in a sample mean of 80 . The population standard deviation is $\sigma = 15$.
   (a) Compute the 95% confidence interval for the population mean.
   (b) Assume that the same sample mean was obtained from a sample of 120 items. Provide a 95% confidence interval for the population mean.
   (c) What is the effect of a larger sample size on the interval estimate?

4. A 95% confidence interval for a population mean was reported to be 152 to 160 . If $\sigma = 15$, what sample size was used in this study?

5. Assisted-Living Facility Rent. Costs are rising for all kinds of medical care. The mean monthly rent at assisted-living facilities was reported to have increased 17% over the last five years to \$3486. Assume this cost estimate is based on a sample of 120 facilities and, from past studies, it can be assumed that the population standard deviation is $\sigma = \$650$.
   (a) Develop a 90%, 95% and 99% confidence interval estimate of the population mean monthly rent.
   (b) What happens to the width of the confidence interval as the confidence level is increased? Does this seem reasonable? Explain.

§. Problems when we don't know Population Standard Deviation σ

6. The following sample data are from a normal population: $10, 8, 12, 15, 13, 11, 6, 5$.
   (a) What is the point estimate of the population mean?
   (b) What is the point estimate of the population standard deviation?
   (c) With 95% confidence, what is the margin of error for the estimation of the population mean?
   (d) What is the 95% confidence interval for the population mean?

7. A simple random sample with $n = 54$ provided a sample mean of 22.5 and a sample standard deviation of 4.4.

   (a) Develop a 90%, 95% and 99% confidence interval for the population mean.

   (b) What happens to the margin of error and the confidence interval as the confidence level is increased?

   Remarks: Note that all the problems are taken from Anderson et al. (2020). If possible you should do more problems from there. Anderson et al. (2020) called interval estimates as confidence intervals. So when you are asked to calculate Confidence Intervals, just calculate the interval estimates for the fixed sample.

References:

Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., Cochran, J. J., Fry, M. J. and Ohlmann, J. W. (2020), *Statistics for Business & Economics*, 14th edn, Cengage, Boston, MA.