

PROBLEM SET - 1 (ESTIMATION AND TESTING)

ECO 204 (Spring 2025)

Instructor: Shaikh Tanvir Hossain

Due: 10.00 AM, March 10, 2025, Please Submit in Google Classroom in a HTML file

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You should write the solutions neatly in a R Markdown file and submit the HTML file before the deadline, I will give the solutions after the deadline. Please ask me in Discord if you have any questions.

Point and Interval Estimation

1. Generate a sample of size 250 from $\mathcal{N}(10, 4)$ in **R**, estimate the sample mean and sample variance of the sample in **R** (you can use the function `seed()` to reproduce your results). Now increase the sample size of the sample to 500 and estimate the sample mean and sample variance of the sample in **R**. What do you observe?
2. Solve Following Problems from Chapter 8 (Interval Estimation) of Anderson et al. (2020),
 - (a) From 8.1 Methods # 1, 2, 3, 4 Applications # 5 (data: Houston), 9 (data: Tobacco Fires), 10
 - (b) From 8.2 Methods # 11, 12, 13, 14, Applications # 16 (data: CorporateBonds), 17 (data: Miami), 20 (data: AutoInsurance), 21 (data: TeleHealth)
 - (c) From 8.3, Methods # 23, 29
 - (d) From 8.4, Methods # 31, 32, 33, 34 Applications # 35, 37 (data: Right Direction), 38 (data: Causal Dining), 40, 43

Hypothesis Testing

3. Solve Following Problems from Chapter 9 (Hypothesis Testing) of Anderson et al. (2020). Problems from 9.1 are not mathematical problems, you just need to formulate the correct hypotheses. Problems from 9.3 and 9.4 are all applications problems. I intentionally gave all the problems from the applications section. Please try to solve them all using **R** and avoid calculator!
 - (a) From 9.1 # 1, 2, 3, 4
 - (b) From 9.3 Applications # 15, 16, 17, 18, 19, 20, 21 (data: Fowle), 22
 - (c) From 9.4 Applications # 27, 28, 29 (data: ResidentialWater), 30 (data: ChildCare), 31, 32 (data: UsedCars), 33, 34
 - (d) From 9.4 Applications # 39 (data:HomeState), 43 (data:Eagle), 44 (data:LawSuit)

Remarks: Most of the problems are taken from Anderson et al. (2020). If possible you should do more problems from Anderson et al. (2020) and Newbold et al. (2022). There are some differences when it comes to terminologies, in particular 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 a fixed sample. This terminology is not standard, for example DeGroot and Schervish (2012) and Casella and Berger (2002) use *confidence Interval* as *interval estimators*, which is a random object. We will treat confidence interval as a random object!

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.

Casella, G. and Berger, R. L. (2002), *Statistical Inference*, 2nd edn, Thomson Learning, Australia ; Pacific Grove, CA.

DeGroot, M. H. and Schervish, M. J. (2012), *Probability and Statistics*, 4th edn, Addison-Wesley, Boston.

Newbold, P., Carlson, W. L. and Thorne, B. M. (2022), *Statistics for Business and Economics*, 10th, global edn, Pearson, Harlow, England.