

Homework 2

MED131 and MBG211
2023 Fall

December 6, 2023

Due: December 14 2023

Questions (20 points each)

- The mean serum-creatinine level measured in 12 patients 24 hours after they received a newly proposed antibiotic was 1.2 mg/dL.
 - If the mean and standard deviation of serum creatinine in the general population are 1.0 and 0.4 mg/dL, respectively, then, using a significance level of $\alpha = .05$, test whether the mean serum-creatinine level in this group is different from that of the general population.
 - What is the p-value for the test?
 - Suppose the sample standard deviation of serum creatinine is 0.6 mg/dL. Assume that the standard deviation of serum creatinine is not known, and re-perform the hypothesis test. Report a p-value.
 - Compute a two-sided 95% confidence interval (CI) for the true mean serum-creatinine level.
 - How does the CI relate to your p-value?
- Use the t-table and a computer program to compute the probability that a t distribution with 36 df exceeds 2.5.
- Use the t-table and a computer program to compute the lower 10th percentile of a t distribution with 54 df.
- Plasma-glucose levels are used to determine the presence of diabetes. Suppose the mean ln (plasma-glucose) concentration (mg/dL) in 35- to 44-year-olds is 4.86 with standard deviation = 0.54. A study of 100 sedentary people in this age group is planned to test whether they have a higher or lower level of plasma glucose than the general population.
 - If the expected difference is 0.10 ln units, then what is the power of such a study if a two-sided test is to be used with $\alpha = .05$?
 - How many people would need to be studied to have 80% power under the assumptions?
 - Answer, if the expected difference is 0.20 ln units.
 - How many people would need to be studied to have 95% power under the assumptions? (assuming that the difference is 0.20 ln units.)
- Suppose the incidence rate of myocardial infarction (MI) was 5 per 1000 among 45- to 54-year-old men. To look at changes in incidence over time, 5000 men in this age group are followed and 15 new cases of MI were found in this year.
 - Using the critical-value method with $\alpha = .05$, test the hypothesis that incidence rates of MI changed.
 - Report the p-value.
 - Compute a two-sided 95% confidence interval (CI) for the true proportion.
 - How does the CI relate to your p-value?