ASDS 5301: Project 2

Topic: Single sample test

Administration of a drug was suspected to cause reduced alkaline phosphatase levels in adult males, a population known to have an alkaline phosphatase mean (μ) of 60 with a standard deviation (σ) of 15. To test this, a sample of 100 men were treated and the data on their alkaline phosphatase levels are presented in the file "alkaline.txt". Write a report by answering the following questions:

(i) Import the alkaline data as a data frame by using a suitable R/SAS function.

(ii) State the null and alternate hypotheses for the testing under consideration.

(iii) Test the hypothesis at 5% level of significance using a suitable R/SAS function. Use both p-value method and critical value method. Draw appropriate conclusions.

(iv) Calculate the power of the test for the alternative $\mu = 55$.

(v) Plot the power curve of the test for a suitable set of alternatives. Display the power curve and comment.

(vi) Calculate the sample size required to achieve a power of 80%, 85% and 90%. What can you conclude from your findings.

(vii) Now, assume that administration of the drug is suspected to alter the alkaline phosphatase level.

- (a) Repeat parts (ii) and (iii) and draw proper conclusions in each case.
- (b) Calculate the power of the test for the alternatives $\mu = 65$ and $\mu = 55$, separately.
- (c) Repeat part (vi) and draw proper conclusion.
- (d) Draw the power curve of the test for the alternatives $\mu = (45, 45.1, \cdots, 59.9, 60.1, 60.2, \cdots, 75)$ and comment.

Instructions

- The project must be done using a suitable statistical software (e.g., R or SAS).
- No manual calculations/derivations are allowed.
- In all cases, the relevant software codes and outputs must be displayed.
- The project must be written using Microsoft Word or LaTeX.