

Introduction to Statistics - Homework #9

- Use Appendix C: Distribution tables (e.g. Z-table) from page 408 to 417 in the textbook if necessary.

Practice

A nutrition researcher wants to test whether a new diet increases average daily protein intake. Group 1 follows the new diet, while Group 2 follows their usual eating habits. To test this at the significance level $\alpha = 0.05$, the researcher samples $n_1 = 16$ diet participants and $n_2 = 12$ control participants. Assume the intakes follow:

$$X_{11}, \dots, X_{1,16} \sim N(\mu_1, 64), \quad X_{21}, \dots, X_{2,12} \sim N(\mu_2, 144),$$

where μ_1 and μ_2 denote the mean protein intakes for Group 1 and Group 2, respectively.

(1) State the null and alternative hypotheses.

(2) Find the test statistic and its null distribution.

(3) Find the rejection region.

(4) Given $\bar{x}_1 = 80$ and $\bar{x}_2 = 74$, complete the hypothesis test.

(5) Find the power of the test assuming $\mu_1 - \mu_2 = 10$.