

DUE DATE: December 10, 2025

Verify all assumptions.

- 1) A company has collected data of monthly sales (\$), advertising expenditure (\$), number of competing products available, and the warranty period of the product. Data is given in the worksheet **Sales**.
  - a. Identify the dependent variable (DV) and the independent variables (IV's) in this problem.
  - b. Does the linear model provide a good fit to the data?
  - c. Predict the sales when advertising expenditure= 400, number of competitors= 1, and warranty= 6 months.
  
- 2) The worksheet **Supermarket** has observations on Profits, Food-sales, Nonfood-sales and Store-size with DV=profit, and other variables as independent variables.
  - a. Fit a Multiple Linear Regression for DV as a function of the 3 IV's. Do you think the fitted model describes the data well?
  - b. State and verify assumptions.
  - c. Predict Profit when Food-sales= 300, Nonfood-sales= 80, Store-size= 30.
  - d. Suppose a supermarket with -sales= 300, Nonfood-sales= 80, Store-size= 30 has reported Profit=24. Do you think there is a problem with the profitability of this supermarket?
  - e. Determine VIF's for the predictors. If there is multicollinearity in the data, find a better model.
  
- 3) A restaurant chain has collected data on sales with no promotions, promotion 1 (flyer in Sunday newspaper), promotion 2 (radio ad), and promotion 3 (discount coupons). The data is given in the worksheet **Restaurant**.
  - a. How would you statistically determine if any of the promotions work?
  - b. Write down  $H_0$ ,  $H_1$ , run the appropriate test, and interpret the results. Use  $\alpha = .05$ .
  - c. Which promotion seems to be the best (in case ANOVA results are significant)?
  - d. State and verify assumptions.

DUE DATE: December 12, 2021

Verify all assumptions.

- 4) The data in the worksheet **Savings** provide personal savings and personal income (in billions of dollars) for the time period 1935-1949.
  - (a) Plot the data as a scatter diagram showing peacetime years with dots and wartime years with crosses.
  - (b) Using as values for the dummy variable  $X_2 = 0$  for peacetime and  $X_2 = 1$  for wartime, determine the estimated regression equation.  $\hat{Y} = a + b_1X_1 + b_2X_2$ .
  - (c) Plot the two lines obtained from this equation corresponding to wartime and peacetime on your scatter diagram.
  
- 5) The worksheet **Magazine Preference** shows magazine preference by age-group from a survey of random sample of 510 children and young adults. Is magazine preference independent of age of respondent? (10 points)