RIT

STAT 614 Applied Statistics

Fall 2023

Homework #11

Regression

Answer the following questions. You should use software to answer these questions. It is not enough simply to paste the computer output for the solution. You need to tell me which part of the output answers the question. Do not provide unrelated computer output. For equations and math text, use an equation editor. All solutions MUST be typed. You need to show ALL work, including output from JMP or other software packages. It is not recommended to use reference tables as it leads to less accurate results. You cannot copy and paste results from AI software, I consider this plagiarism. If your results closely resemble AI results, points WILL be deducted. Unless otherwise stated, assume $\alpha = 0.05$.

1. The college placement office is developing a model to relate grade point average (GPA) to starting salary for liberal arts majors. Twenty recent graduates have been randomly selected and their GPAs and starting salaries are provided in HW10.xslx.
    a. Fit a simple linear regression model to the data. What is the estimate for β_0 and β_1 ? Give the fitted regression model.
    b. Test the hypothesis $H_0: \beta_1 = 0$. Include the alternative hypothesis, test statistic, critical value, p-value, decision, and conclusion (with context to the problem).
    c. What is R^2? Interpret this value.
    d. Find the estimate for mean starting salary when GPA is 3.6.
    e. What is $\hat{\sigma}^2$?

2. A hospital administrator wishes to study the relation between patient satisfaction and patient's age, severity of illness, and anxiety level. The data is in HW10.xslx.
    a. Fit a linear regression model with the three predictor variables.
    b. Using t tests, what can be implied about β_1, β_2, and β_3 (just conclusion required)?
    c. Interpret the estimated value of β_1, the regression coefficient for patient's age.
    d. Obtain a prediction for patient satisfaction with respect to a 35-year-old patient, who has a 45 severity of illness index and a 2.2 anxiety level index.
    e. Construct a normal probability plot of the residuals, what can you conclude?
    f. Construct a residual versus predicted plot, what can you conclude?