STAT 615 REGRESSION

CLASSWORK/LAB 1

Instructions: Produce an R Markdown File and the associated Word File that show all required Script, Work, and R Code. Post both files on Canvas.

Airfreight breakage. A substance used in biological and medical research is shipped by airfreight to users in cartons of 1,000 ampules. The data below, involving 10 shipments, were collected on the number of times the carton was transferred from one aircraft to another over the shipment route (X) and the number of ampules found to be broken upon arrival (Y). Assume that first-order regression model is appropriate.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| i | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Xi | 1 | 0 | 2 | 0 | 3 | 1 | 0 | 1 | 2 | 0 |
| Yi | 16 | 9 | 17 | 12 | 22 | 13 | 8 | 15 | 19 | 11 |

1. Obtain the estimated regression function. Plot the estimated regression function and the data (use R to generate the scatter plot and the regression

line) Does a linear regression function appear to give a good fit in this case?

1. Obtain a point estimate of the expected number of broken ampules when X = 1 transfer is made.
2. Estimate the increase in the expected number of ampules broken when there are 2 transfers as compared to 1 transfer. (Hint: Use the slope of the model)
3. Find the specific residual for Xi = 3. Show all of your work . Determine if the observed value of 22 is above or below average.
4. Verify that your fitted regression line goes through the point (Xbar, Ybar)
5. Which value in the R summary output table determines if your model is doing a good job explaining the variation in the dependent variable produced by the model. In this case identify this specific proportion of variation.