**Normality assumptions**

**Problem:**

A soft drink bottler is analyzing the vending machine service routes in his distribution system. He is interested in predicting the amount of time required by the route driver to service the vending machines in an outlet. This service activity includes stocking the machine beverage products and minor maintenance or housekeeping. The industrial engineer responsible for the study has suggested that the two most important variables affecting the delivery time (Y) are the number of cases of product stocked (X1), and the distance walked by the route driver (X2). The engineer has collected 25 observations on delivery time, which are shown below in the table:

|  |  |  |  |
| --- | --- | --- | --- |
| ObservationNo | DeliveryTimeY | NumberOfCasesX1 | DistanceX2 |
| 1 | 16.68 | 7 | 560 |
| 2 | 11.5 | 3 | 220 |
| 3 | 12.3 | 3 | 340 |
| 4 | 14.88 | 4 | 80 |
| 5 | 13.75 | 6 | 150 |
| 6 | 18.11 | 7 | 330 |
| 7 | 8 | 2 | 110 |
| 8 | 17.83 | 7 | 210 |
| 9 | 79.24 | 30 | 1460 |
| 10 | 21.5 | 5 | 605 |
| 11 | 40.33 | 16 | 688 |
| 12 | 21 | 10 | 215 |
| 13 | 13 | 4 | 255 |
| 14 | 19.75 | 6 | 462 |
| 15 | 24 | 9 | 448 |
| 16 | 29 | 10 | 776 |
| 17 | 15.35 | 6 | 200 |
| 18 | 19 | 7 | 132 |
| 19 | 9.5 | 3 | 36 |
| 20 | 35.1 | 17 | 770 |
| 21 | 17.9 | 10 | 140 |
| 22 | 52.32 | 26 | 810 |
| 23 | 18.75 | 9 | 450 |
| 24 | 19.83 | 8 | 635 |
| 25 | 10.75 | 4 | 150 |

Use R to check that whether the error term follows normality with constant variance or not. Interpret your results and give your comment about heteroscedasticity.

The evaluation pattern is as follows:

|  |  |  |
| --- | --- | --- |
| Section | Parameters | Marks |
| A | Objective/Aim | 4 |
| B | Analysis | 6 |
| C | Interpretation | 6 |
| D | Timely submission | 4 |
| Total |  | 20 |