1. A rocket motor is manufactured by bonding together two types of propellants, an igniter and a sustainer. The shear strength of the bond (Y) is thought to be a linear function of the age of the propellant (X) when the motor is cast. Twenty observations are shown in the following table.

|  |  |  |
| --- | --- | --- |
| Observation | Shear Strength (Y) | Age of Propellant (X) |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20 | 2158.70  1678.15  2316.00  2061.30  2207.50  1708.30  1784.70  2575.00  2357.90  2256.70  2165.20  2399.55  1779.80  2336.75  1765.30  2053.50  2414.40  2200.50  2654.20  1753.70 | 15.50  23.75  8.00  17.00  5.50  19.00  24.00  2.50  7.50  11.00  13.00  3.75  25.00  9.75  22.00  18.00  6.00  12.50  2.00  21.50 |

Fit a simple linear regression to the data that involving the following steps by using R.

1. Plot the scatter diagram for the data .
2. Estimate the parameters of a simple linear regression model.
3. Obtain the fitted values of the model.
4. Show that the sum of fitted values and sum of observed values of Y are equal.
5. Obtain the residuals and show that the sum of residuals is zero.

The evaluation pattern is as follows:

|  |  |  |
| --- | --- | --- |
| Section | Parameters | Marks |
| A | Objective/Aim | 2 |
| B | Analysis | 3 |
| C | Interpretation | 3 |
| D | Timely submission | 2 |
| Total |  | 10 |