1. The article “The Undrained Strength of Some Thawed Permafrost Soils” (*Canadian Geotechnical Journal*, 1979, pp. 420-427) contained the following data on undrained shear strength of sandy soil (Y, in kPa), depth (X1, in meters) and water content (X2, in percent). State and test the hypothesis for significance of regression 1, 2, 11, 22, 12 at = 0.05 by estimating a multiple linear regression model. Perform backward stepwise regression. Fit the full model. If any predictor variable is not statistically significant, remove it from the model in order of highest to lowest p-value > 0.05 = and create a new model. Remove each non-significant variable one at a time following **hierarchical order** and create a new model after removing each non-significant variable. In your submission, report each regression model and the final regression model with only statistically significant predictors, its R-squared and Adjusted R-squared, and in the final model plot and analyze the residuals from the experiment and comment on model adequacy..

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Seq | X1 | X2 | X1Sq | X2Sq | X1X2 | Y |
| 1 | 6.9 | 37.5 | 47.61 | 1406.25 | 258.75 | 14.7 |
| 2 | 6 | 36.3 | 36.00 | 1317.69 | 217.80 | 16 |
| 3 | 15.8 | 25.9 | 249.64 | 670.81 | 409.22 | 45.4 |
| 4 | 14.4 | 28.8 | 207.36 | 829.44 | 414.72 | 38.8 |
| 5 | 6.5 | 36.9 | 42.25 | 1361.61 | 239.85 | 16.9 |
| 6 | 5.1 | 39.1 | 26.01 | 1528.81 | 199.41 | 10 |
| 7 | 9.9 | 33.3 | 98.01 | 1108.89 | 329.67 | 24.9 |
| 8 | 6.9 | 37.2 | 47.61 | 1383.84 | 256.68 | 16 |
| 9 | 7.3 | 33.9 | 53.29 | 1149.21 | 247.47 | 20.7 |
| 10 | 16.6 | 26.3 | 275.56 | 691.69 | 436.58 | 48 |
| 11 | 3.9 | 40.6 | 15.21 | 1648.36 | 158.34 | 7.3 |
| 12 | 11 | 33.1 | 121.00 | 1095.61 | 364.10 | 27 |
| 13 | 6.9 | 36.3 | 47.61 | 1317.69 | 250.47 | 16.8 |
| 14 | 5 | 36.4 | 25.00 | 1324.96 | 182.00 | 12.8 |