> library(readr)

> dataxy <- read.table("dataxy.txt", header = TRUE)

> View(dataxy)

> ## Dataset ##

> dataxy

x y

1 124.899403 141.794859

2 76.884554 137.955281

3 10.824256 17.907235

4 324.667916 273.097965

5 120.045005 62.860476

6 120.745675 65.902874

7 110.444777 215.424127

8 9.461987 13.373291

9 71.243568 61.510482

10 40.049586 29.241211

11 14.440574 21.226351

12 54.109919 38.470751

13 28.525079 15.696156

14 89.062818 54.068128

15 75.274861 69.720369

16 35.088710 31.241327

17 16.479621 15.827016

18 51.574396 73.311107

19 6.241330 5.287396

20 17.693693 31.276318

21 52.286436 28.527686

22 8.827452 10.227488

23 20.112870 30.781690

24 12.072060 18.796012

25 9.108619 12.007274

26 242.963123 182.595707

27 28.850766 40.021504

28 10.805967 9.517010

29 14.655687 9.379913

30 30.775198 49.349015

31 18.178231 23.948973

32 67.631707 46.677725

33 10.606957 15.670239

34 61.462907 51.900010

35 5.308919 3.644295

36 2.996053 4.947110

37 7.273225 10.619005

38 13.422811 9.854998

39 36.839086 35.799592

40 12.091897 7.579147

41 68.284269 132.749052

42 45.481351 39.167071

43 27.187009 29.393401

44 45.156746 26.256211

45 12.501935 19.729818

46 5.049055 5.184491

47 9.164551 4.806023

48 175.980735 216.278197

49 35.231971 64.788443

50 21.987999 42.095776

>

>

> ## Plotting the data ##

> x <- dataxy$x

> y <- dataxy$y

>

> plot(x, y, main = "X vs Y",

+ xlab = "X", ylab = "Y")

>

> ## Creating Linear Regression Model and plotting ##

> linreg <- lm(y ~ x)

> abline(linreg, col = "red")

> summary(linreg)

Call:

lm(formula = y ~ x)

Residuals:

Min 1Q Median 3Q Max

-49.451 -10.356 -4.778 1.543 111.519

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 7.18891 5.05175 1.423 0.161

x 0.87569 0.06368 13.752 <2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 27.66 on 48 degrees of freedom

Multiple R-squared: 0.7976, Adjusted R-squared: 0.7933

F-statistic: 189.1 on 1 and 48 DF, p-value: < 2.2e-16

> ## The linear model appears to have a moderately strong relation with b1 being 0.875. It has a positive direction indicating positive relation and is of linear form ##

>

> ## plotting the residual ##

> dataxy$residuals <- residuals.lm(linreg)

> dataxy$residuals

[1] 25.2322161 63.4389827 1.2395839 -18.4008888 -49.4511968 -47.0223717 111.5193222 -2.1014285 -8.0660352

[10] -13.0189042 1.3919097 -16.1019221 -16.4720105 -31.1126105 -3.3863298 -6.6745758 -5.7930078 20.9587777

[19] -7.3670115 8.5931379 -24.4481728 -4.6915726 5.9800496 1.0356656 -3.1580031 -37.3546996 7.5681351

[28] -7.1346256 -10.6429016 15.2104314 0.8414856 -19.7359050 -0.8071246 -9.1116351 -8.1936052 -4.8654259

[37] -2.9390274 -9.0881938 -3.6491057 -10.1985705 65.7639770 -7.8496116 -1.6030248 -20.4762167 1.5930324

[46] -6.4258477 -10.4082334 54.9839068 26.7470873 15.6520952

>

> ## residual vs x ##

> plot(x, dataxy$residuals, main = "Residuals vs X", xlab = "X", ylab = "Residuals")

> ## The residuals against x have most of their points around Residual = 0 indicating that the variance of the residuals is less ##

>

> ## Scatterplot of y vs x ##

> plot(y, x, main = 'Y vs X', xlab = "y", ylab = "x")

> ## Likewise the if a line were to be fitted for y against x we would see strong strength given the close clusters of data points ##

>

> ## Brown-Forsythe Test ##

>

> n1 = x[1:25]

> n1

[1] 124.899403 76.884554 10.824256 324.667916 120.045005 120.745675 110.444777 9.461987 71.243568

[10] 40.049586 14.440574 54.109919 28.525079 89.062818 75.274861 35.088710 16.479621 51.574396

[19] 6.241330 17.693693 52.286436 8.827452 20.112870 12.072060 9.108619

> n2 = x[26:50]

> n2

[1] 242.963123 28.850766 10.805967 14.655687 30.775198 18.178231 67.631707 10.606957 61.462907

[10] 5.308919 2.996053 7.273225 13.422811 36.839086 12.091897 68.284269 45.481351 27.187009

[19] 45.156746 12.501935 5.049055 9.164551 175.980735 35.231971 21.987999

> ## i) e1 and e2 ##

> e1bar <- median(dataxy$residuals[1:25])

> e1bar

[1] -4.691573

> e2bar <- median(dataxy$residuals[26:50])

> e2bar

[1] -4.865426

>

> ## ii) d1 and d2 ##

> di1 <- c()

> for(i in dataxy$residuals[1:25]){

+ di1[[i]] <- abs(i - e1bar)

+ return(di1)

+ }

> print(di1)

[1] NA NA NA NA NA NA NA NA NA NA NA NA

[13] NA NA NA NA NA NA NA NA NA NA NA NA

[25] 29.92379

>

> di2 <- c()

> for (i in dataxy$residuals[26:50]){

+ di2[[i]] <- abs(i - e2bar)

+ return(di2)

+ }

Error in di2[[i]] <- abs(i - e2bar) :

attempt to select less than one element in integerOneIndex

> print(di2)

NULL

>

> ## iii) T- test statistic BF ##





