a)



b)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: SALES | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/08/15 Time: 19:38 | | |  |  |
| Sample: 1 20 | |  |  |  |
| Included observations: 20 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 29.62689 | 4.881527 | 6.069185 | 0.0000 |
| ADVERTISING | -0.324575 | 0.458911 | -0.707272 | 0.4885 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.027039 | Mean dependent var | | 26.30000 |
| Adjusted R-squared | -0.027014 | S.D. dependent var | | 5.759203 |
| S.E. of regression | 5.836474 | Akaike info criterion | | 6.460770 |
| Sum squared resid | 613.1598 | Schwarz criterion | | 6.560344 |
| Log likelihood | -62.60770 | Hannan-Quinn criter. | | 6.480208 |
| F-statistic | 0.500234 | Durbin-Watson stat | | 1.993831 |
| Prob(F-statistic) | 0.488454 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

a = 29.62, b = -0.32

S.E of b = 0.45, t-stats of b = -0.7 insignificant null hypothesis is accepted

H0 = b=0

H1 b does not equal to zero

c)



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| obs | Actual | Fitted | Residual | Residual Plot |
| 1 | 24.0000 | 25.7320 | -1.73199 | | . \*| . | |
| 2 | 27.0000 | 25.7320 | 1.26801 | | . |\* . | |
| 3 | 25.0000 | 26.7057 | -1.70572 | | . \*| . | |
| 4 | 27.0000 | 26.0566 | 0.94343 | | . \* . | |
| 5 | 23.0000 | 27.6794 | -4.67944 | | .\* | . | |
| 6 | 25.0000 | 26.7057 | -1.70572 | | . \*| . | |
| 7 | 27.0000 | 24.7583 | 2.24173 | | . |\* . | |
| 8 | 25.0000 | 27.6794 | -2.67944 | | . \*| . | |
| 9 | 26.0000 | 26.0566 | -0.05657 | | . \* . | |
| 10 | 27.0000 | 24.4337 | 2.56631 | | . |\* . | |
| 11 | 25.0000 | 26.0566 | -1.05657 | | . \*| . | |
| 12 | 50.0000 | 27.6794 | 22.3206 | | . | . \* |
| 13 | 26.0000 | 25.4074 | 0.59258 | | . \* . | |
| 14 | 23.0000 | 26.0566 | -3.05657 | | .\* | . | |
| 15 | 26.0000 | 25.4074 | 0.59258 | | . \* . | |
| 16 | 23.0000 | 27.3549 | -4.35487 | | .\* | . | |
| 17 | 23.0000 | 27.0303 | -4.03029 | | .\* | . | |
| 18 | 24.0000 | 27.0303 | -3.03029 | | .\* | . | |
| 19 | 26.0000 | 25.7320 | 0.26801 | | . \* . | |
| 20 | 24.0000 | 26.7057 | -2.70572 | | . \*| . | |

for exceptional week i.e. 12, the difference between actual and fitted residual is more, whereas for the rest of the graph, the actual and fitted residuals are almost the same.

d)

once we realized that the results of b is not significant, we have to look into the data again as R-square was still not much, sum of squared residuals was more, and the coefficient of advertising was insignificant, so we have to look into the data, and check the data again.

e)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: SALES | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/08/15 Time: 19:51 | | |  |  |
| Sample (adjusted): 1 19 | | |  |  |
| Included observations: 19 after adjustments | | | |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 21.12500 | 0.954848 | 22.12394 | 0.0000 |
| ADVERTISING | 0.375000 | 0.088196 | 4.251873 | 0.0005 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.515372 | Mean dependent var | | 25.05263 |
| Adjusted R-squared | 0.486864 | S.D. dependent var | | 1.470967 |
| S.E. of regression | 1.053705 | Akaike info criterion | | 3.041803 |
| Sum squared resid | 18.87500 | Schwarz criterion | | 3.141217 |
| Log likelihood | -26.89713 | Hannan-Quinn criter. | | 3.058628 |
| F-statistic | 18.07842 | Durbin-Watson stat | | 1.749172 |
| Prob(F-statistic) | 0.000538 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

a = 21.12

b = 0.37

SE of b = 0.088 and tstats of b = 4.25 b is significant

Not null hypothesis is rejected and b is significantly different from 0.

f)

in part b, the value of b is insignificant, null hypothesis was accepted and b is not significantly different from 0. But after the deletion of special week from our observation i.e. week 12, now the regression results are significant with t-value greater then +-2, b is significant, null hypothesis is rejected and b is significantly different from 0. With wrong results i.e. in part b, we could predict wrong results. So, it is necessary that the coefficients must be statistically significant.