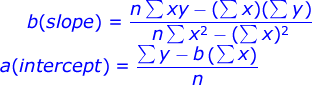
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Econ 4140/5140 | | | |  | |  | | Homework #3 | | | | |
| Managerial Economics | | | |  | |  | | Due Feb 16, 2016 | | | | |
| Answer finishing this assignment, paste it into Word, then | | | | | | | | | | | |  |
| submit it to turnitin because it will not accept Excel files. | | | | | | | | | | | |  |
|  |  | | Regression Problems | | | | |  | |  | |
| 1) (10 points) Estimate the values of a & b using the formulas in text and using the | | | | | | | | | | | |
| regression tools in Excel. Show your results. Verify that they are the same. | | | | | | | | | | | |
|  | sellexp | | sales | | x^2 | | y^2 | | xy | |
|  | 1 | | 4 | | 1 | | 16 | | 4 | |
|  | 2 | | 6 | | 4 | | 36 | | 12 | |
|  | 4 | | 8 | | 16 | | 64 | | 32 | |
|  | 8 | | 14 | | 64 | | 196 | | 112 | |
|  | 6 | | 12 | | 36 | | 144 | | 72 | |
|  | 5 | | 10 | | 25 | | 100 | | 50 | |
|  | 8 | | 16 | | 64 | | 256 | | 128 | |
|  | 9 | | 16 | | 81 | | 256 | | 144 | |
|  | 7 | | 12 | | 49 | | 144 | | 84 | |
| total | 50 | | 98 | | 340 | | 1212 | | 638 | |
| mean | 5.555555556 | | 10.8888889 | |  | |  | |  | |
| b= | 1.503571429 |
|  |  |
| a= | 2.535714286 |

b=9(638)-(50)(98)/9\*340-(50)^2

b= 1.503571429

a= 10.8888-1.503571429(5.5555)

a= 2.53571429





|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2) 15 points |  |  |  |  |  |  |
| a) Regress sales against selling expense and price using Excel's regression tool. | | | | | |  |
| b) Regress sales against selling expense and price using Excel's "linest" feature. | | | | | |  |
| (Hint: use the Excel help feature to see how the "linest" feature works. | | | | |  |  |
| The regression results should be the same as using the regression tool in 2a.) | | | | | |  |
| c) Calculate Yhat and the residuals. Show your work in columns. What do the residuals sum to? | | | | | | |
| d) Calculate the standard error of the estimate using the residuals. Verify that this is | | | | | |  |
| the result obtained by Excel in part a) or part b). | | | |  |  |  |

1)



2)



3)



4) Standard Error: (SSE/n-k-1)^0.5

Standard Error: (0.822113821/6)^0.5

Standard Error: 0.370160736

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3) 20 points. The heating costs in January are shown for 20 homes in the following | | | | | | |
| table. The outside temperature, inches of attic insulation and the age of the furnace are shown in the | | | | | | |
| table. |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| a)      Estimate the regression equation where cost is the dependent variable and the others are the | | | | | | |
| independent variables using Excel. Present your results. | | | |  |  |  |
|  |  |  |  |  |  |  |
| b)      What is the estimated heating cost for a home where the mean outside temperature is 30 | | | | | | |
| degrees, there are 5 inches of insulation in the attic, and the furnace is 10 years old. Show your | | | | | | |
| calculations. |  |  |  |  |  |  |

1)



2) Y= 455.155841-4.52843857Temp-14.7126667Insul+6.011109219Age

Y= 455.155841-4.52843857(30)-14.7126667(5)+6.011109219(10)

Y=305.8501855

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 4)      20 points. The selling price (in $1,000), the number of bedrooms, the size (square feet), | | | | | | |
| swimmingpool (dummyvariable), distance to center of town, garage (dummy variable), and number of | | | | | | |
| baths are shown for asample of 105 homesales transactions | | | | |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| a.      Regress the selling price as a function of the independent variables. Show your result. | | | | | | |
| b.      How much does the selling price increase as the size increases by one square foot? | | | | | | |
| c.      How much more does a garage add to the selling price? | | | | |  |  |
| d.   Is the distance to the center of town statistically significant? Use a p-value of .025 in each | | | | | | |
| tail, i.e., a 95% confidence level. You can use the TINV command in Excel to look up the critical t-value | | | | | | |

1) 

2) The selling prices by 0.031 ($31) anytime with the space by one square foot.

3) Having a garage adds 38.66 ($38,660) to the value of the house.

4) t-Statistic: -1.28262013

t-Critical: 1.9844675

Ho: Distance=0

Ha: Distance≠0

The value of the T- Critical is higher than T-Statistic; therefore, we fail to Reject Ho.

|  |  |  |
| --- | --- | --- |
| 5) (20 points) Create a simple Pivot table in Excel showing how the avearge price of homes varies as | | |
| the number of bedrooms varies from 1 to 8, using the data from problem 4. |  |  |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 6) 15 points |  |  |  |  |
| In the simple linear regression model, use the normal equations | | | | |
| (the first order conditions of minimizing the sum of squared errors) | | | | |
| to prove that b = Σ(xi – xbar)(yi – ybar)/Σ(xi – xbar)2 . | | | |  |
| (Show all of your work.) | |  |  |  |

∂Q/∂B=Ʃ[2(Y1-Bo-B1X1). ∂/∂B0(Y1-Bo-B1Xi)]=-2Ʃ(Yi-Bo-B1X1)= 0

∂Q/∂B1=Ʃ[2(Y1-Bo-B1X1). ∂/∂B1(Y1-Bo-B1Xi)=-2Ʃ(Yi-Bo-B1Xi)Xi=0

(-1/2)-2Ʃ(Yi-Bo-B1Xi)=0(-1/2)

Ʃ(Y1-Bo-B1Xi)=0

ƩYi-nBo-B1ƩX1=0

n.Bo= ƩYi-B1ƩXi

Bo= 1/nƩYi-Bi1/nƩXi

Bo= Ybar-B1Xbar

Ʃ(Yi-(Ybar-Bi)-B1Xi=0

Ʃ(Yi-Ybar)-B1(Xi-Xbar)Xi=0

Ʃ(Yi-Ybar)Xi -B1Ʃ(Xi-Xbar)Xi=0

B1= Ʃ(Yi-Ybar)Xi/ Ʃ(Xi-Xbar)Xi

B1= Ʃ(Yi-Ybar)Xi- XbarƩ(Yi-Ybar)/Ʃ(Xi-Xbar)Xi-XbarƩ(Xi-Xbar)

B1=Ʃ(Xi-Xbar)(Yi-Ybar)/Ʃ(Xi-Xbar)^2