|  |
| --- |
| > Conc=c( 0, 5, 10, 15, 20, 25, 30)  > Abso=c( 0.003, 0.127, 0.251, 0.390, 0.498, 0.625, 0.763)  >  > length(Abso)  [1] 7  >  > mean(Abso)  > [1] 0.3795714 |

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| --- |
| > Conc=c( 0, 5, 10, 15, 20, 25, 30)  > Abso=c( 0.003, 0.127, 0.251, 0.390, 0.498, 0.625, 0.763)  > plot(Conc,Abso)  > length(Abso)  [1] 7  > mean(Abso)  [1] 0.3795714  > FitA=lm(Abso~Conc)  > summary(FitA) |

|  |
| --- |
| Call:  lm(formula = Abso ~ Conc)  Residuals:           1          2          3          4          5          6          7   0.0008929 -0.0009286 -0.0027500  0.0104286 -0.0073929 -0.0062143  0.0059643  Coefficients:               Estimate Std. Error t value Pr(>|t|)  (Intercept) 0.0021071  0.0047874    0.44    0.678  Conc        0.0251643  0.0002656   94.76 2.48e-09 \*\*\*  ---  Signif. codes:  0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1  Residual standard error: 0.007026 on 5 degrees of freedom  Multiple R-squared: 0.9994,     Adjusted R-squared: 0.9993  F-statistic:  8980 on 1 and 5 DF,  p-value: 2.481e-09 |

Regression Equation

***Abso.fitted = 0.0021 + 0.251 Conc***

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| --- |
| Remarks   * Number of Independent (Predictor) variables : k = 1 * Number of paired observations : n=7 * Degrees of freedom :   + df1 =k =1   + df2 = n-k-1 = 5 |

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| --- |
| Regression Equation for FitA  Abso.fitted = 0.0021+ 0.0251 conc  TSS= 0.4435157  Mean (Abso)= 0.3795714  SSR=0.4432689  SSE=0.0002468214  TSS = SSR + SSE  0.4435157 = 0.4432689 + 0.0002468214 |

Notice that TSS is the sum of SSR and SSE

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| --- |
| > anova(FitA)  Analysis of Variance Table  Response: Abso            Df  Sum Sq Mean Sq F value    Pr(>F)  Conc       1 0.44327 0.44327  8979.5 2.481e-09 \*\*\*  Residuals  5 0.00025 0.00005  ---  Signif. codes:  0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1  > |

Remark : The Total Sums of Squares is not included in the output.

|  |
| --- |
| MSR = SSR/(k)  MSE = SSE/(n-k-1)  The test statistic is Fts = MSR/MSE  (I have added a subscript “ts” to emphasis the term’s purpose as a Test Statistic for a hypothesis test)  MSE = SSE/n-k-1 = 4.936429e-05  MSR= SSR/k = 0.4432689  Test statistic = 36.64 |

The associated p-value

The null hypothesis is the independent variables used in the model jointly describes the response of the fitted model.

* H0: β1 = β2 = ...= βn = 0
* H1: At least one of the β values for the independent variables is not zero.

We have a very low p-value. So we reject the null hypothesis. The independent variables can indeed be used to build a model for the response variable