This is the data we're given Y	Summary	Implementing MLR in Excel	
1		This is the data we're given	
1		V	
1 5.5 5.8 9.1			
3 8.2 7.9 7.7 4 5.1 9.5 8.6 5 8.2 8.5 8.4 7 9.6 8.22 8.5 8.4 7 9.6 8.24 9.5 8 7.4 8.4 7.2 9 6.5 5.5 7.3 9 6.5 5.5 7.3 9 10 8.9 11 9.59 7.5 6.9 14 9.59 7.5 6.9 15 6.67 7.6 7.9 Equation GPA at college Equation Interview Response variable:			
4 9.1 9.5 9.6 5 8.2 9.1 7.5 6 8.32 8.5 8.4 7.8 9 6.5 5.6 7.2 10 8.44 7.8 9 6.5 5.6 7.2 11 9.5 9.6 9.3 11 9.5 9.6 9.3 12 13 7.5 7.6 9.9 13 7.5 7.6 7.9 14 9.99 10 8.9 15 8.87 7.6 7.9 Equation GPA at college Equation Linterview Response variable: [Equation] • We want to explain the variation in the response variable using these two explanatory variable of the process of the proc		2 6.3 7.5 7.1	
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Equation Entrance exam Equation Interview			
Explanatory variables: Equation • We want to explain the variation in the response variable using these two explanatory variable Correlation Coefficients of Equation with Equation		[Equation] Entrance exam [Equation] Interview	
GPA at college		Explanatory variables: [Equation]	
Interview 0.763282985 Interview O.763282985 Interview O.768780487 Interview O.76878648		Correlation Coefficients of [Equation] with [Equation]:	
Interview 0.763282985 Interview O.763282985 Interview O.768780487 Interview O.76878648		CDAt -> ll>	
Entrance exam 0.74665952 interview 0.763282985			
Individual influence of Equation (Entrance exam) on Equation (GPA) Y			
Individual influence of [Equation] (Entrance exam) on [Equation] (GPA)			
Y X1 GPA at college Entrance exam		111ter view 0.703282383	
Y X1 GPA at college Entrance exam		Individual influence of (Francisco (Entrance every) on (Francisco (CDA))	
SUMMARY OUTPUT Regression Statistics Multiple R			
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Adjusted R Square 0.523462011 Standard Error 0.78574914 Observations 15 ANOVA		Y X1 GPA at college Entrance exam	
Standard Error 0.78574914 Observations 15 ANOVA		Y X1 GPA at college Entrance exam SUMMARY OUTPUT Regression Statistics	
$\frac{\text{Observations}}{\text{ANOVA}} = \frac{df}{ss} \frac{ss}{MS} \frac{MS}{F} \frac{F}{slgnificance F}$ Regression 1 10.11215109 10.11215109 16.37856019 0.00138404 Residual 13 8.026222245 0.617401711 Total 14 18.13837333 $\frac{Coefficients}{14} \frac{Standard Error}{14} \frac{t}{18.13837333} \frac{t}{11} \frac{V-value}{11} \frac{Lower 95\%}{11} \frac{Upper 95\%}{11} \frac{Upper 95\%}{11} = \frac{Coefficients}{11} \frac{Standard Error}{11} \frac{t}{11} Standard Er$		Y X1 GPA at college Entrance exam SUMMARY OUTPUT Regression Statistics Multiple R 0.74665952 R Square 0.557500439	
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		Y X1 GPA at college Entrance exam SUMMARY OUTPUT Regression Statistics Multiple R 0.74665952 R Square 0.557500439 Adjusted R Square 0.523462011 Standard Error 0.78574914 Observations 15 ANOVA	
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This SLR tells us that the entrance exam score is a good explanatory variable for <i>Y</i> (conclude from the P-value of Entrance exam).		Y	
from the P-value of Entrance exam).		Y	
Individual influence of [Equation] (interview) on [Equation] (GPA)		Y X1 GPA at college Entrance exam SUMMARY OUTPUT Regression Statistics Multiple R 0.74665952 R Square 0.557500439 Adjusted R Square 0.78574914 Observations 15 ANOVA df SS MS F Significance F Regression 1 10.11215109 10.1215109 16.37856019 0.00138404 Regression 1 10.11215109 10.17215109 16.37856019 0.00138404 D.00138404 D.00138404 D.00138404 D.00138404 D.00138404 D.00138404 D.00138404 0.3035763235 1.104705921 • Standard Error: s_c • Standard Error: s_c • Standard Error: s_c <th col<="" td=""></th>	
		Summary Output Regression Statistics Multiple R	

GPA at college interview

SUMMARY OUTPUT

Regression Statistics				
Multiple R	0.763282985			
R Square	0.582600915			
Adjusted R Square	0.550493293			
Standard Error	0.76313828			
Observations 15				

ANOVA

	df	SS	MS	F	Significance F
Regression	1	10.56743289	10.56743289	18.14525272	0.00093024
Residual	13	7.570940441	0.582380034		
Total	14	18.13837333			

	Coefficients S	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.470298787	1.846585182	0.254685672	0.802950357	-3.519005962	4.459603536
interview	0.934785006	0.219447292	4.259724488	0.00093024	0.460697953	1.408872058

- [Equation] values tells us that the regression is significant ([Equation]).
- Coefficient of interview: [Equation] Estimate of [Equation] (marginal slope).
- This SLR tells us that the interview score is a good explanatory variable for Y.

• Interpret:

- o Multiple R
- o R Square
- o Adjusted R Squared
- Regression df?
- Residual df?
- Total df?

Multiple Linear Regression (MLR)

X1 X

GPA at college Entrance exam interview

SUMMARY OUTPUT

Regression Statistics				
Multiple R	0.860528625			
R Square	0.740509514			
Adjusted R Square	0.6972611			
Standard Error	0.626281041			
Observations 15				

ANOVA

	df	SS	MS	F	Significance F
Regression	2	13.43163802	6.715819012	17.12223502	0.000305301
Residual	12	4.70673531	0.392227942		
Total	14	18.13837333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-0.704401949	1.576544	-0.446801326	0.662975358	-4.139396243	2.730592345
Entrance exam	0.455442321	0.168539069	2.702295228	0.019227553	0.088227236	0.822657406
interview	0.62250322	0.213981085	2.909150685	0.013101725	0.156278487	1.088727953

- Multiple R: [Equation] correlation coefficient between observed value(y) and the fitted/predicted value(ŷ).
- R Square: explanatory power of this model.

 [Equation] these two explanatory variables are able to explain [Equation] in the variation of GPA.
- [Equation] (two explanatory variables)
- [Equation] .
- Adjusted R Square: [Equation] more realistic view of [Equation] . The explanatory power of the model is is actually [Equation] (and not [Equation]).

df	[Equation]
Regression Residual 1	• We're estimating [Equation] parameters. [Equation] Regression [Equation] .
Total 1	
	• Total [Equation] .

• [Equation] values tells us that the regression is significant ([Equation]).

[Equation] for Entrance Exam

	P-value Intercept 0.662975358 Entrance exam 0.019227553 interview 0.013101725 Equation null hypothesis Equation s a good estimate of Equation c Equation null hypothesis Equation for interview Equation null hypothesis Equation null
Part the [Equation] for the intercept is [Equation], so how are we [Equation] estimating?	 [Equation] Regression Equation: [Equation] . Here, [Equation] and [Equation] are partial slopes. e.g., keeping constant [Equation] , one unit increase in [Equation] is expected to increase [Equation] by 0.455 units.