



# REGRESI LINIER

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Regression and correlation are closely related. Both techniques involve the relationship between two variables, and they both use the same set of paired scores taken from the same subjects. However, while correlation is concerned with the magnitude and direction of the relationship, regression focuses on applying the relationship for prediction.

- For each subject in the study, there must be *related pairs of scores*. That is, if a subject has a score on variable  $X$ , then the same subject must also have a score on variable  $Y$ .
- The variables should be measured at least at the *ordinal level*.

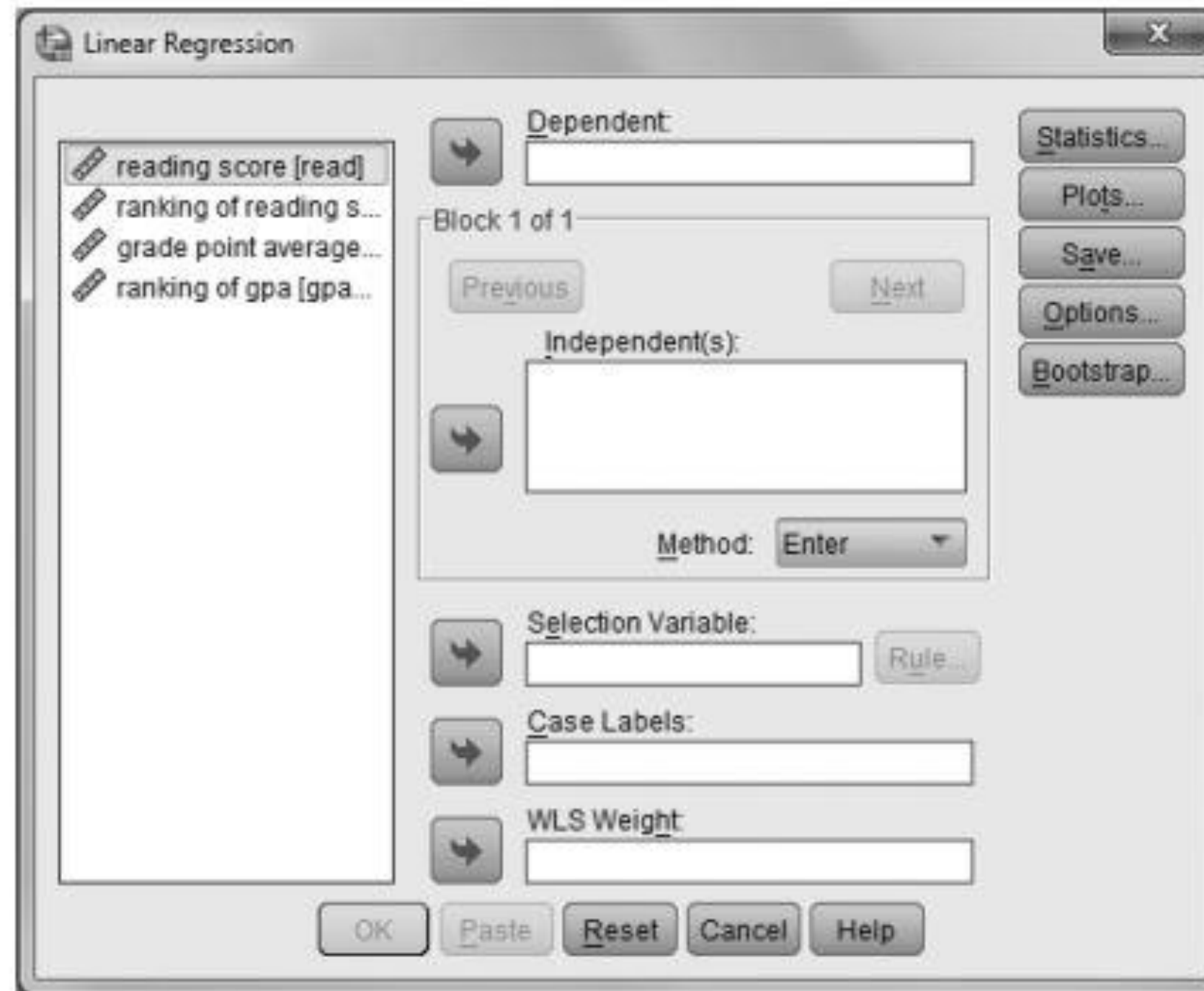
- **Linearity**—The relationship between the two variables must be *linear*, that is, the relationship can be more accurately represented by a straight line.
- **Homoscedasticity**—The variability of scores on the  $Y$  variable should remain constant at all values of the  $X$  variable.



In this example, we wish to (1) find the prediction equation that allows us to best predict students' grade point average scores (**GPA**) from their reading scores (**READ**), (2) determine the strength of this relationship, and (3) test the null hypothesis that **READ** and **GPA** scores are unrelated.

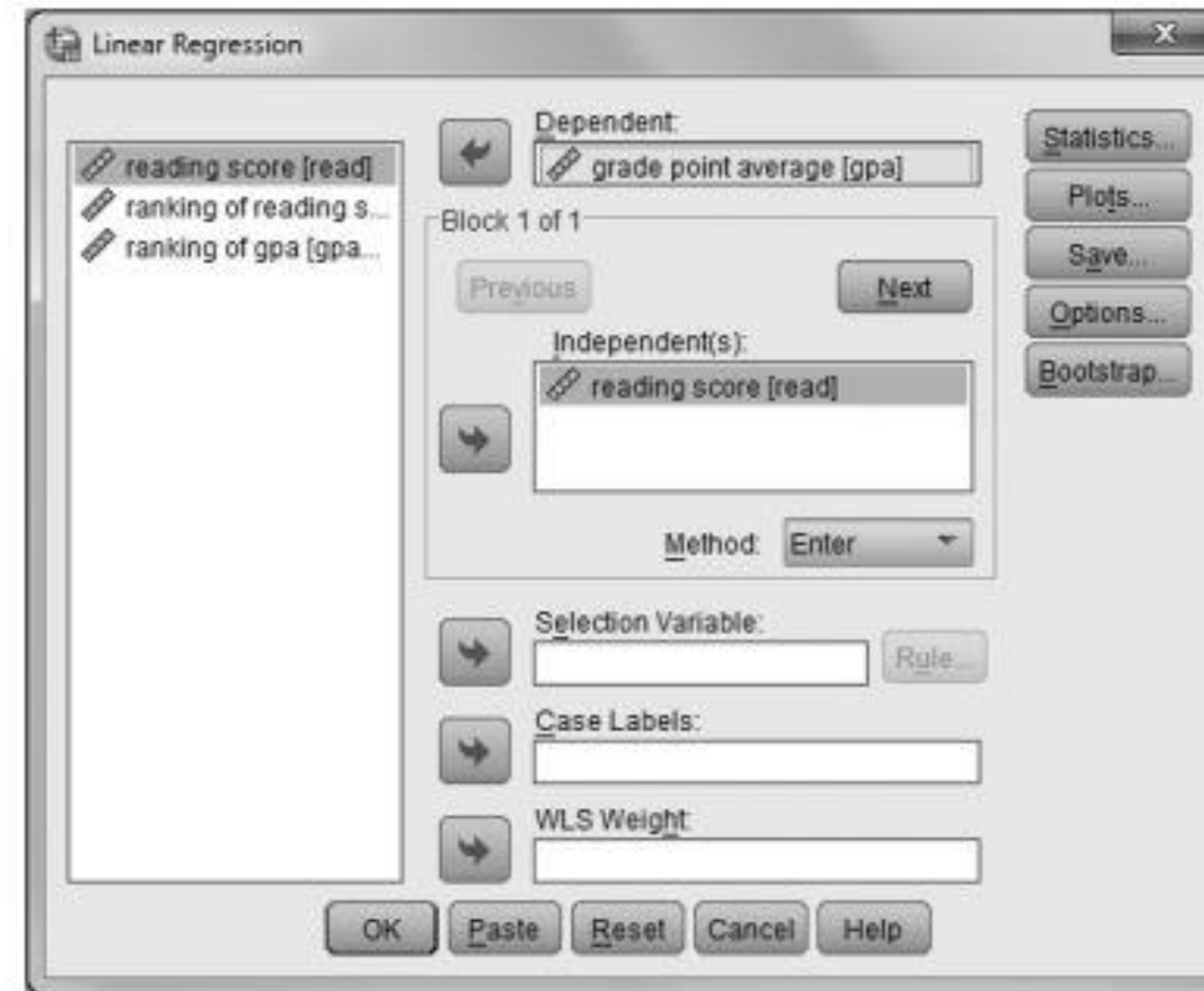
# Windows Method

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1. From the menu bar, click **Analyze**, then **Regression**, and then **Linear**. The following **Linear Regression** window will open.

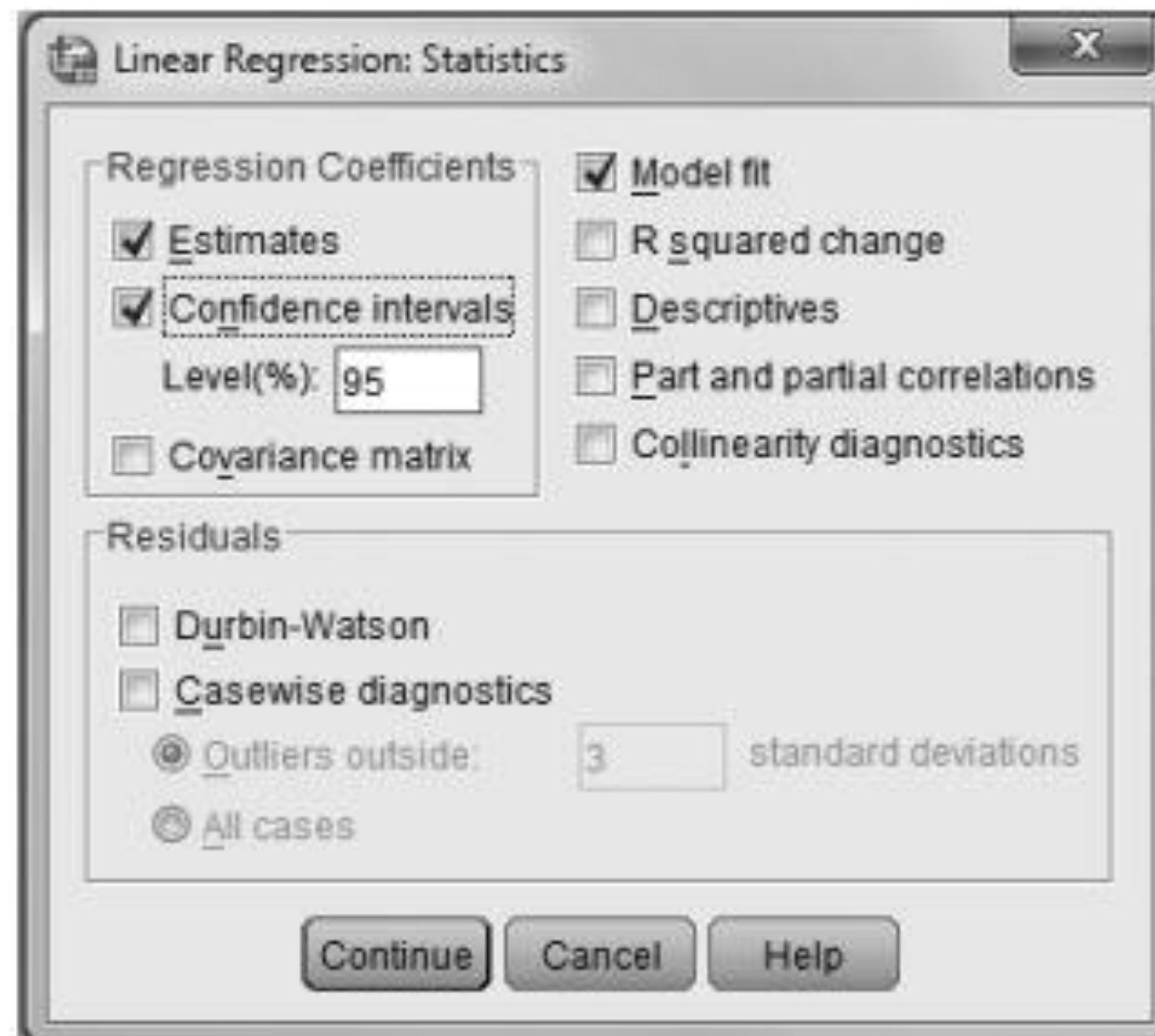


2. Click (highlight) the **GPA** variable and then click  to transfer this variable to the **Dependent:** field. Next, click (highlight) the **READ** variable and then click  to transfer this variable to the **Independent(s):** field. In the **Method:** field, select **Enter** from the drop-down list as the method of entry for the independent (predictor) variable into the prediction equation.



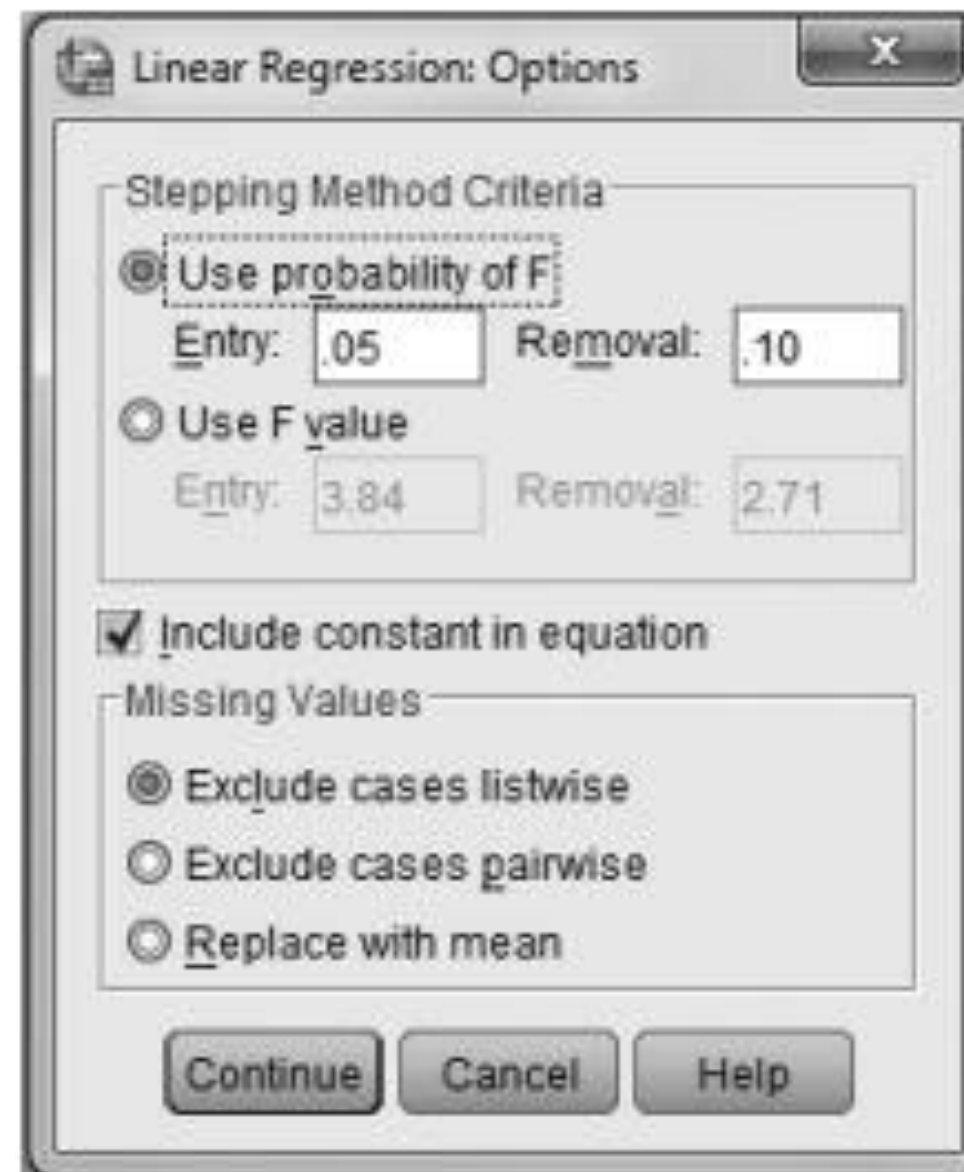


3. Click **Statistics** to open the **Linear Regression: Statistics** window. Check the fields to obtain the statistics required. For this case, check the fields for **Estimates**, **Confidence intervals**, and **Model fit**. Click **Continue** when finished.

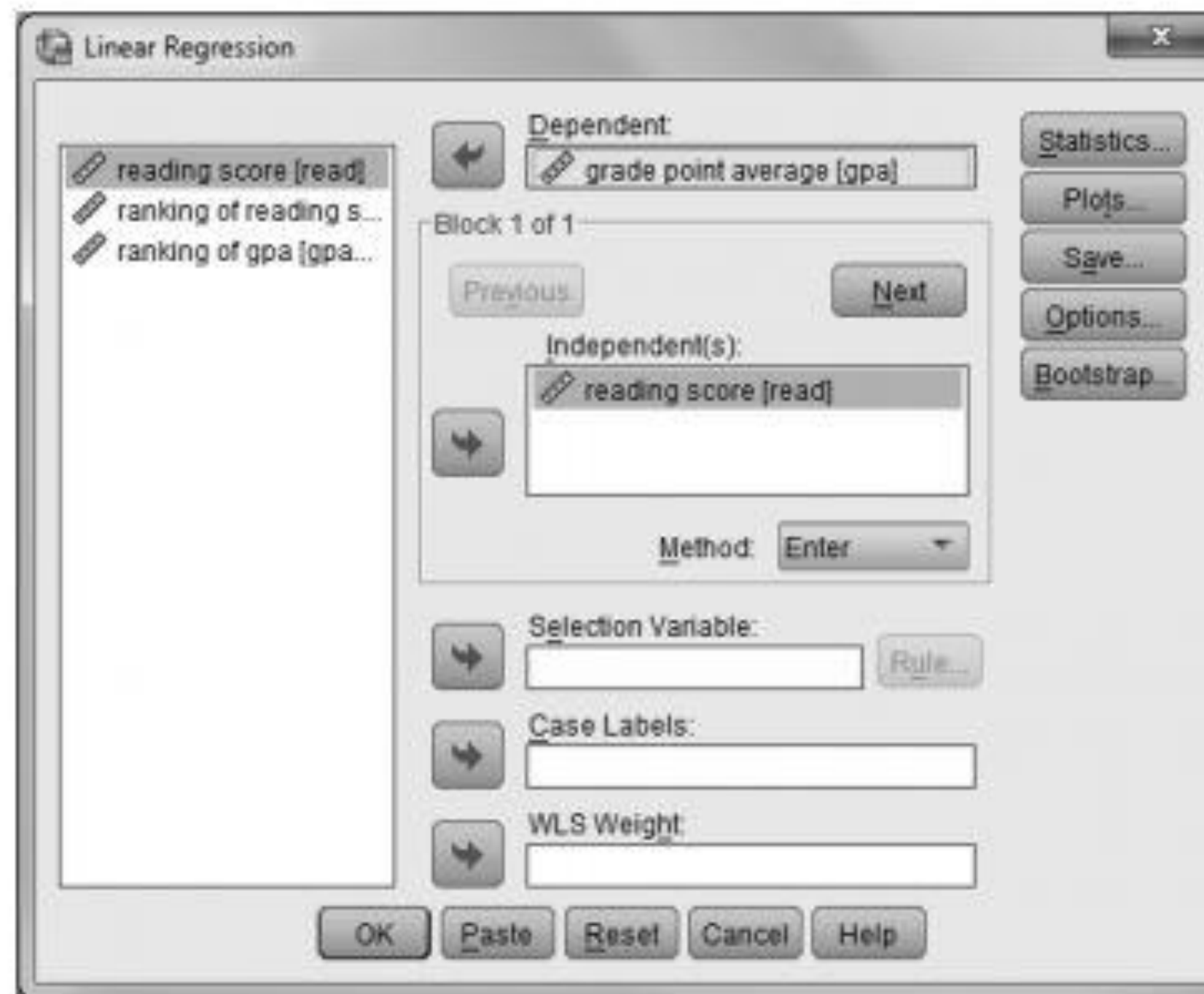




4. When the **Linear Regression** window opens, click **Options** to open the **Linear Regression: Options** window below. Ensure that both the **Use probability of F** and the **Include constant in equation** fields are checked. Click **Continue** to return to the **Linear Regression** window.



5. When the **Linear Regression** window opens, click **OK** to complete the analysis. See Table 11.1 for the results.



## Linear Regression Analysis Output Regression

Variables Entered/Removed <sup>b</sup>			
Model	Variables Entered	Variables Removed	Method
1	Reading score <sup>a</sup>	.	Enter

<sup>a</sup> All requested variables entered.

<sup>b</sup> Dependent Variable: grade point average.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867 <sup>a</sup>	.752	.733	.32848

<sup>a</sup> Predictors: (Constant), reading score.



ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	4.253	1	4.253	.39.418	.000 <sup>a</sup>
Residual	1.403	13	.108		
Total	5.656	14			

<sup>a</sup> Predictors: (Constant), reading score.

<sup>b</sup> Dependent Variable: grade point average.

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
1 (Constant)	-.111	.446		-.248	.808	-1.075	.853
reading score	.061	.010	.867	6.278	.000	.040	.082

<sup>a</sup> Dependent Variable: grade point average.

## Prediction Equation

The prediction equation is  $Y' = A + BX$  where  $Y'$  is the predicted dependent variable,  $A$  is the constant,  $B$  is the unstandardized regression coefficient, and  $X$  is the value of the predictor variable.

The relevant information for constructing a least-squares regression (prediction) equation is presented in the **Coefficients** table

In order to predict the students' grade point average scores (**GPA**) from their reading scores (**READ**), use the values presented in the **Unstandardized Coefficients** column. Using the **Constant** and **B** (unstandardized coefficient) values, the prediction equation would be: Predicted GPA =  $-0.111 + (.061 \times \text{READ})$



Thus, for a student who has a reading score of 56, his/her predicted GPA score will be:  
Predicted GPA =  $-0.111 + (.061 \times 56) = 3.31$

However, in the **Model Summary** table, the **Standard Error of the Estimate** is 0.32848. This means that at the 95% confidence interval, the predicted GPA score of 3.31 lies between the scores of **2.66** ( $3.31 - (1.96 \times 0.32848)$ ) and **3.95** ( $3.31 + (1.96 \times 0.32848)$ )

In a simple regression such as this, where there is only one predictor variable, the multiple  $R$  is equivalent to the simple  $R$  (Pearson product-moment correlation). For this example, the multiple correlation coefficient is 0.867, and the  $R$ -square is 0.752. Therefore, for this sample, the predictor variable of READ has explained 75.2% of the variance in the dependent variable of GPA.

The **ANOVA** table presents results from the test of the null hypothesis that  $R$ -square is zero. An  $R$ -square of zero indicates no linear relationship between the predictor and the dependent variable. The **ANOVA** table shows that the computed  $F$  statistic is 39.42, with an observed significance level of less than 0.001. Thus, the hypothesis that there is no linear relationship between the predictor and the dependent variable is rejected.

The **Coefficients** table presents the **standardized Beta** coefficient between the predictor variable READ and the dependent variable GPA. The Beta coefficient is shown to be positive and statistically significant at the 0.001 level. Thus, the higher the students' reading scores, the higher their GPA scores, (Beta = 0.87),  $t = 6.28$ ,  $p < .001$ . Note that the standardized Beta coefficient of 0.87 is identical to the multiple  $R$  coefficient. This is because there is only one predictor variable.

A company manager wants to know whether there is an influence on Employee Performance Competence. In this case the competence is the independent variable, while the performance is the dependent variable. Furthermore, the manager of Competency and Performance collect data from a sample of 40 employees. The research data as shown below.

No	Competence (X)	Performance (Y)
1	32	36
2	35	39
3	38	49
4	31	41
5	36	38
6	32	36
7	33	37
8	31	41
9	30	40
10	35	43
11	31	36
12	34	35
13	31	34
14	25	40
15	35	40
16	36	44
17	30	32
18	34	41
19	34	44
20	22	26
21	27	33
22	30	35
23	30	37
24	37	44
25	29	36
26	31	29
27	31	41
28	29	32
29	29	36
30	31	37
31	36	42
32	32	39
33	27	31
34	33	35
35	20	28
36	30	39
37	27	39
38	25	36
39	32	38
40	32	35



## NORMALITAS

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Analyze > Descriptive Statistics > Explore

Plots.. Explore dan cek Normality plot with tests

# LINIERITAS

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Analyze – Compare Means – Means

Independent – Dependent Variable

Options – Cek Test of Linearity

Output = Deviation of Linearity > Sig

Atau

F hitung > F tabel

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,692 <sup>a</sup>	,478	,465	3,42590
a. Predictors: (Constant), Competence				

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	11,403		2,575	,014
	Competence	,835	,692	5,904	,000

a. Dependent Variable: Performance

## (Output Model Summary)

In this section display the value of  $R = 0.692$  and the coefficient of determination (Rsquare) amounted to 0,478.

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This suggests the notion that performance (Y) is influenced by 47.8% by Competence (X), while the rest ( $100\% - 47.8\% = 52.2\%$ ) is explained by other causes.

(Output Coefficients a)

In this section displayed a significance value of  $0.000 < 0.05$ , then the appropriate basis for decision making in the regression analysis can be concluded that the Competence significant effect on employee performance.

Thus, increasing the competence of a person it will also improve performance.





# Thank You!

Any Questions?