REGRESSION ANALYSIS:

A CASE STUDY: EXAM SCORE DATA

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Regression analysis is a statistical method used to examine the relationship between one dependent variable (often denoted as Y) and one or more independent variables (often denoted as X_1, X_2,…, X_p). The goal of regression analysis is to model the relationship between the variables, understand how changes in the independent variables are associated with changes in the dependent variable, and make predictions based on the observed data.

Key components of regression analysis include:

1. **Dependent Variable**: This is the variable being predicted or explained by the independent variables. It is denoted as Y.

2. **Independent Variables**: These are the variables that are hypothesized to predict or explain changes in the dependent variable. They are denoted as X_1, X_2,…, X_p.

3. **Regression Equation**: This equation represents the relationship between the dependent variable and the independent variables. It is typically represented as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p + \varepsilon$$

- β_0 is the intercept (the value of Y when all independent variables are zero).
- $\beta_1, \beta_2, \ldots, \beta_p$ are the coefficients (regression coefficients) that represent the effect of each independent variable on Y.
- ε is the error term, representing the difference between the observed Y and the predicted Y from the regression equation.

4. **Regression Analysis Types**:

- Simple Linear Regression: Involves one independent variable.
- Multiple Linear Regression: Involves two or more independent variables.

- Logistic Regression: Used when the dependent variable is categorical.

- Non-linear Regression: Used when the relationship between variables is non-linear.

5. **Purpose: Regression analysis is used for**:

- Predicting values of the dependent variable based on values of the independent variables.

- Assessing the strength and direction of relationships between variables.

- Testing hypotheses about these relationships.

- Controlling for other variables that might influence the dependent variable.

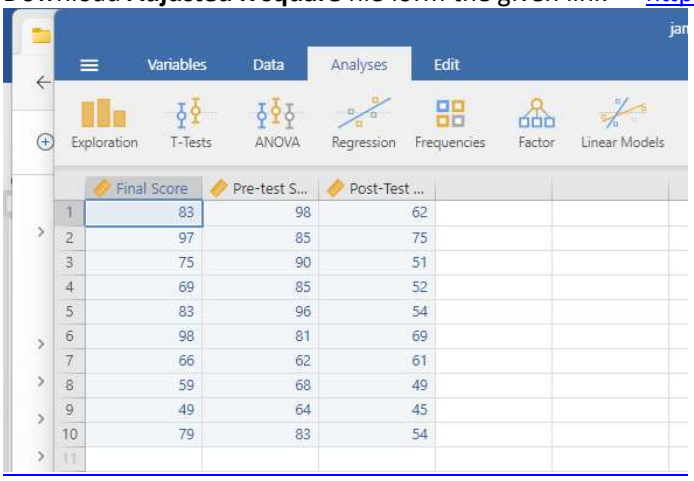
Regression analysis is widely used in various fields such as economics, social sciences, medicine, engineering, and many others, where understanding and predicting relationships between variables are crucial for decision-making and research.

The Problem

The purpose of the study is to ascertain how the results of the pre-test and post-test affect the final score.

Data

Download **Adjusted R square** file form the given link https://dsdhakre.in/Datafiles.html



	Final Score	Pre-test S...	Post-Test ...
1	83	98	62
2	97	85	75
3	75	90	51
4	69	85	52
5	83	96	54
6	98	81	69
7	66	62	61
8	59	68	49
9	49	64	45
10	79	83	54
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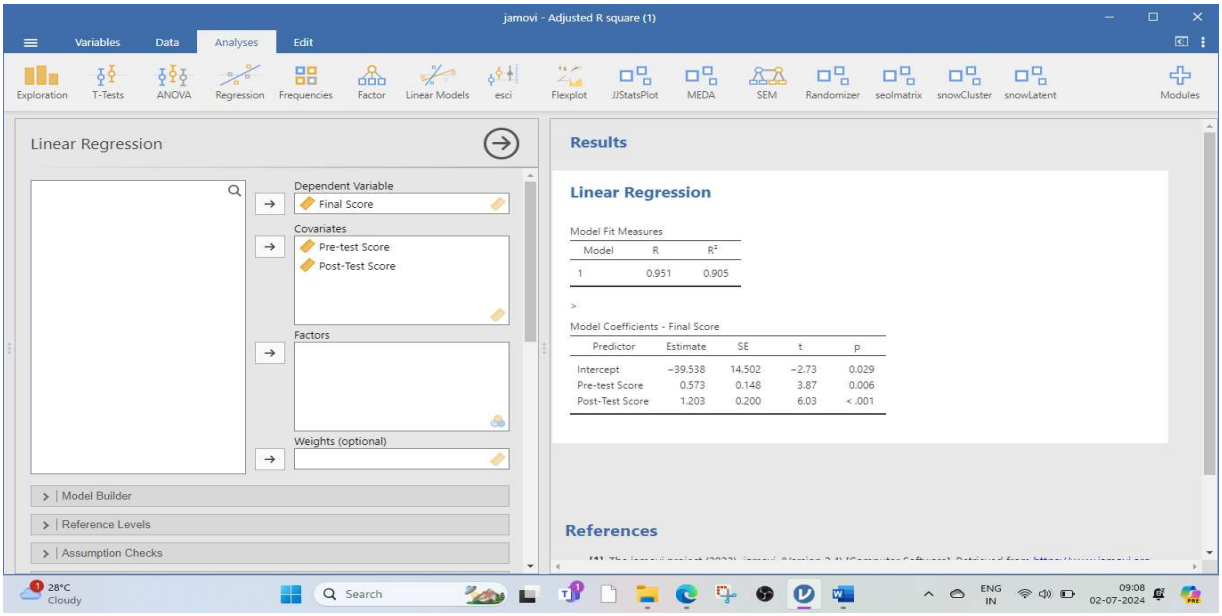
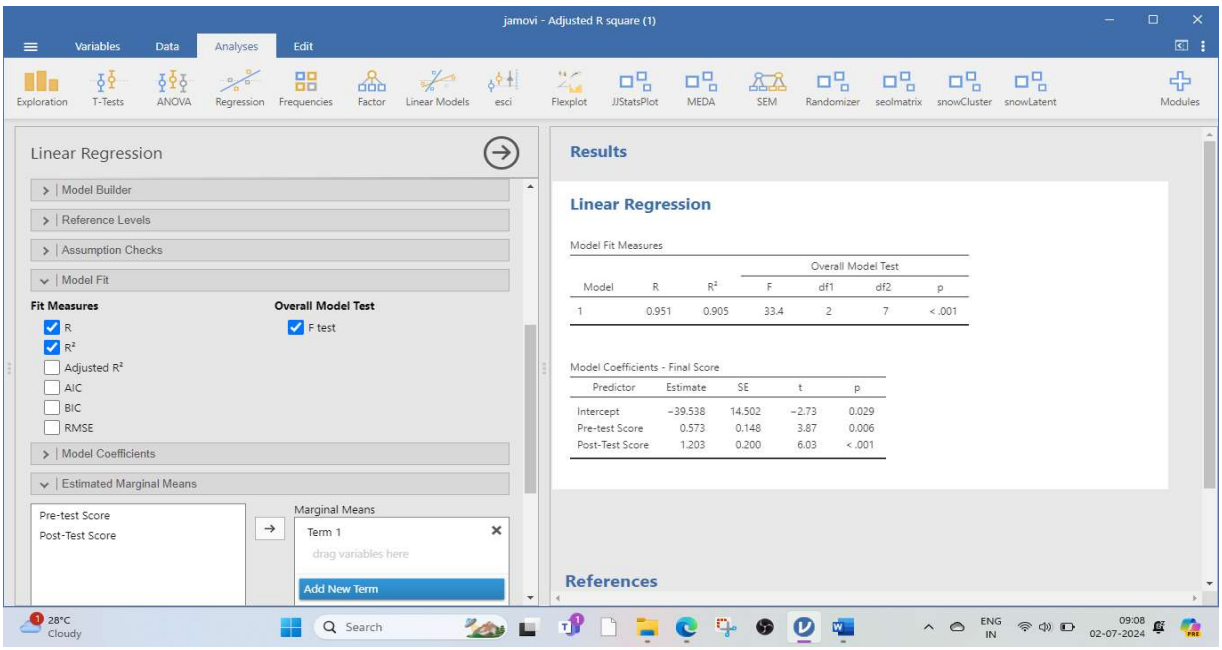
Hypothesis

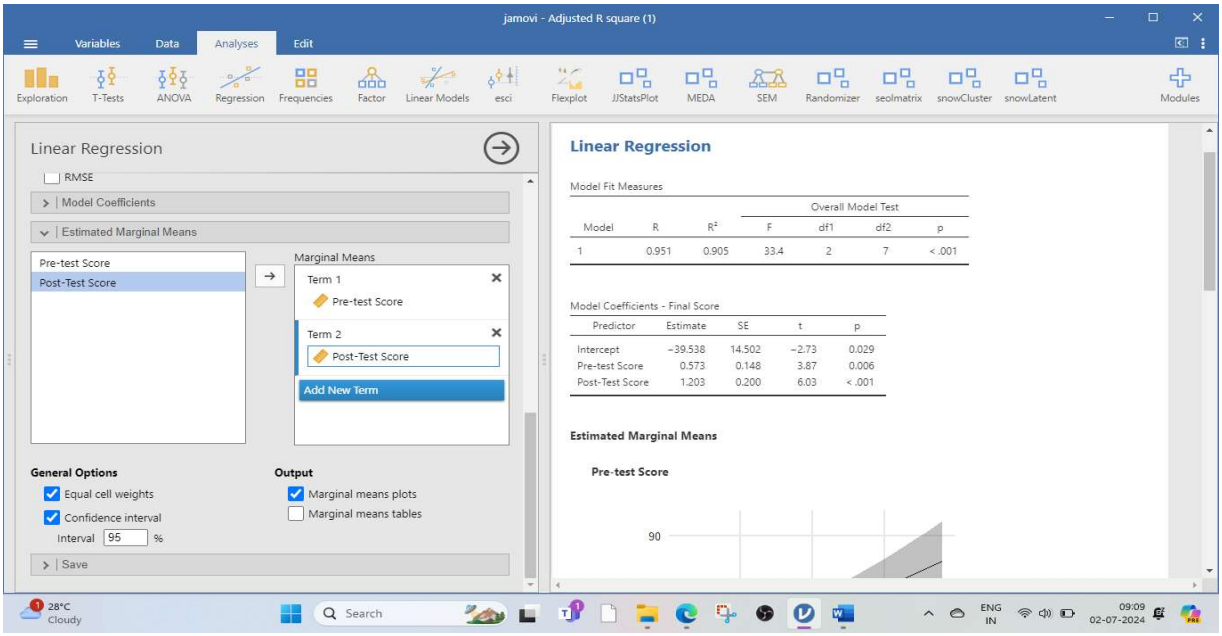
H_{01}: There is no significant impact of Pre-test on Final Score.

H_{02}: There is no significant impact of Post-test on Final Score.

Steps





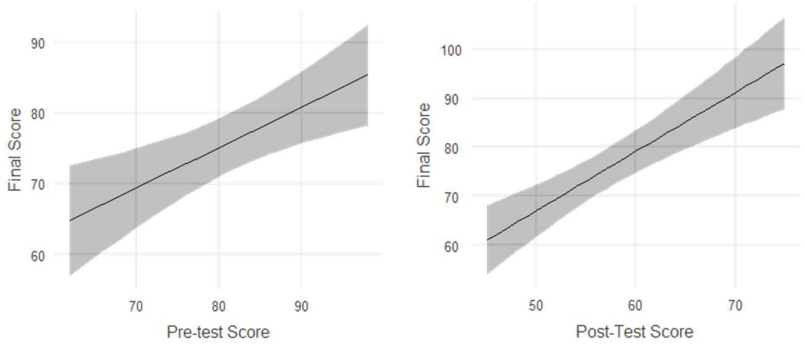


Reporting

The Final score was regressed on predicting variables Pre-test and Post-test. The independent variables under study have a significant impact on final score $F_{(2,7)}$ =12, p<0.001. Moreover, the adjusted R^2=0.878 depicts that the 88% in the final score due to Pre and post test score. Coefficients were further assessed to ascertain the influence of each of the variable on the final score. The results revealed that pre-test has a significantly and positively impact on final score (β_1=0.573,t=3.87,p=0.006). Hence H_{01} was supported. As well as, the post-test also a significantly and positively impact on final score (β_2=1.203,t=6.03,p=0.001). Hence H_{02} was also supported.

Table shows the summary of the findings.

Hypotheses	Regression Weights	Beta Coefficient	t-value	p-value	Result
H_{01}	Pre-test→Final Score	0.573	3.87	0.006	Supported
H_{02}	Post-test→Final Score	1.203	6.03	0.001	Supported
R^2	0.905	Adjusted R^2	0.878		
$F_{(2,7)}$	33.4 (p=0.001)				



Do your self

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