**Q1//** From the following linear model****:

**1- Prove that** 

**2- Prove that **

**Q2// 1- What are the assumptions about the random error** **?**

**2- Prove that **

**Q3//** From the following data

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *X*i | 4 | 5 | 3 | 6 | 7 | 8 | 9 | 11 | 5 | 12 |
| *Y*i | 3 | 4 | 2 | 5 | 7 | 7 | 6 | 4 | 3 | 9 |

**Requirements:**

1. **Explain the relation between (*X*i) and (*Y*i) through the scatter plot.**
2. **Estimate the following linear model () and explain it.**
3. **Test the slope of regression line.** 
4. **Find the confidence intervals for the intercept  with confidence (0.95)**
5. **Test the significance of the estimated regression model. (Using ANOVA Table)** 

**Q4//** From the following data

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *X*i | 4 | 5 | 3 | 6 | 7 | 8 | 9 | 11 | 5 | 12 |
| *Y*i | 3 | 4 | 2 | 5 | 7 | 7 | 6 | 4 | 3 | 9 |

**Requirements:**

1. **Explain the relation between (*X*i) and (*Y*i) through the scatter plot.**
2. **Estimate the regression model () and explain it.**
3. **Test the slope of regression line.** 
4. **Find the confidence intervals for the intercept  with confidence (0.95)**
5. **Test the significance of the estimated regression model. (Using ANOVA Table)** 

**Q5// 1- Prove that **

**2- Prove that  have linearity property**

**Q6// 1- Estimate the regression coefficients from the following linear model ().**

**Using (*OLS*) method.**

**2- What are the assumptions about the random error.**

**Q7// From the following data:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *X*i | 4 | 5 | 3 | 6 | 7 | 8 | 9 | 11 | 5 | 12 |
| *Y*i | 3 | 4 | 2 | 5 | 7 | 7 | 6 | 4 | 3 | 9 |

1. **Explain the relation between (*X*i) and (*Y*i) through the scatter plot.**

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1. **Estimate the regression line equation (Linear Regression Model) and explain it.**

**Q8// From the following data:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***X*i** | **2** | **4** | **3** | **5** | **3** | **7** | **4** |
| ***Y*i** | **4** | **6** | **5** | **8** | **4** | **10** | **5** |

1. **Explain the relation between (*X*i) and (*Y*i) through the scatter plot.**
2. **Estimate the following linear regression model .**

**Q9// 1- Estimate the regression coefficients from the following linear model ().**

**Using (*OLS*) method.**

**2- Prove that  have linearity property**

**Q10//** From the following linear model:

**1- Estimate the regression coefficients. (*Using OLS method*)**

**2- Prove that **

**Q11//** From the following data

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *X*i | 4 | 5 | 3 | 6 | 7 | 8 | 9 | 11 | 5 | 12 |
| *Y*i | 3 | 4 | 2 | 5 | 7 | 7 | 6 | 4 | 3 | 9 |

**Requirements: if we have the following linear regression model **

**1- Estimate the linear regression model.**

**2- Test the intercept**  **of linear regression model.** 

**3- Test the significance of estimated regression model. (*Using ANOVA Table*)** 

**4- Compute the coefficient of determination (*R*2) and explain the result.**