**Chapter 2**

We assume that the normal error regression model is applicable. This model is:

where:

and , are parameters

are known constants

are independent

**Sampling Distribution of**

**Confidence Interval for**

C.I for

**Tests Concerning**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Hypothesis | | | |
|  |  | |  |
| 2. Test statistic | | | |
|  | | | |
| 3. Decision: Reject if | | | |
|  |  | |  |
| P-value: Reject if | | | |
| p-value= | | p-value |  |

**Sampling Distribution of**

**Confidence Interval for**

C.I for

**Tests Concerning**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Hypothesis | | | |
|  |  | |  |
| 2. Test statistic | | | |
|  | | | |
| 3. Decision: Reject if | | | |
|  |  | |  |
| P-value: Reject if | | | |
| p-value= | | p-value |  |

ANOVA TABLE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source of Variation | d.f | SS | MS | F | p-value |
| Regression | 1 | SSR= |  |  |  |
| Error | n-2 | SSE= |  |  |  |
| Total | n-1 | SSTo= |  |  |  |

1. Hypothesis

(Non liner)

1. Test statistic
2. Decision: Reject if

P-value: Reject if

Q2.6**. Refer to Airfreight breakage Problem 1.21.**

,

d) A consultant has suggested, on the basis of previous experience, that the mean number of broken ampules should not exceed 9.0 when no transfers are made. Conduct an appropriate test, using . State the alternatives, decision rule, and conclusion. What is the P-value of the test?

1. Hypothesis

2. Test statistic

3. Decision: Reject if ,

Then not reject

p-value=

, then we not reject .

at

**Analysis of Variance**

**Source DF Seq SS Contribution Adj SS Adj MS F-Value P-Value**

**Regression 1 160.000 90.09% 160.000 160.000 72.73 0.000**

**Xi 1 160.000 90.09% 160.000 160.000**

**Error 8 17.600 9.91% 17.600 2.200**

**Total 9 177.600 100.00%**

**Coefficients**

**Term Coef SE Coef 95% CI T-Value P-Value VIF**

**Constant 10.200 0.663 (8.670, 11.730) 15.38 0.000**

**Xi 4.000 0.469 (2.918, 5.082) 8.53 0.000 1.00**

**Regression Equation**

**Yi = 10.200 + 4.000 Xi**

Q2.25. Refer to Airfreight breakage Problem 1.21.

a. Set up the ANOVA table. Which elements are additive?

b. Conduct an *F* test to decide whether or not there is a linear association between the number of times a carton is transferred and the number of broken ampules; control the risk at 0.05. State the alternatives, decision rule, and conclusion.

c. Obtain the *t\** statistic for the test in part (b) and demonstrate numerically its equivalence to the *F\** statistic obtained in part (b).

,

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| 1 | 16 | 0 | 1.8 | 0 | 0 | 3.24 | 14.2 | 3.24 |
| 0 | 9 | -1 | -5.2 | 5.2 | 1 | 27.04 | 10.2 | 1.44 |
| 2 | 17 | 1 | 2.8 | 2.8 | 1 | 7.84 | 18.2 | 1.44 |
| 0 | 12 | -1 | -2.2 | 2.2 | 1 | 4.84 | 10.2 | 3.24 |
| 3 | 22 | 2 | 7.8 | 15.6 | 4 | 60.84 | 22.2 | 0.04 |
| 1 | 13 | 0 | -1.2 | 0 | 0 | 1.44 | 14.2 | 1.44 |
| 0 | 8 | -1 | -6.2 | 6.2 | 1 | 38.44 | 10.2 | 4.84 |
| 1 | 15 | 0 | 0.8 | 0 | 0 | 0.64 | 14.2 | 0.64 |
| 2 | 19 | 1 | 4.8 | 4.8 | 1 | 23.04 | 18.2 | 0.64 |
| 0 | 11 | -1 | -3.2 | 3.2 | 1 | 10.24 | 10.2 | 0.64 |
| 10 | 142 | 0 | 0 | 40 | 10 | 177.6 | 142 | 17.6 |

ANOVA TABLE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source of Variation | d.f | SS | MS | F | p-value |
| Regression | 1 | SSR= |  |  | 0.00 |
| Error | 8 | SSE= |  |  |  |
| Total | 9 | SSTo= 177.6 |  |  |  |

1. Hypothesis

2. Test statistic

3. Decision: Reject if ,

Then reject

p-value=

, then we reject .

**Analysis of Variance**

**Source DF Adj SS Adj MS F-Value P-Value**

**Regression 1 160.000 160.000 72.73 0.000**

**Xi 1 160.000 160.000 72.73 0.000**

**Error 8 17.600 2.200**

**Lack-of-Fit 2 0.933 0.467 0.17 0.849**

**Pure Error 6 16.667 2.778**

**Total 9 177.600**

,

Q2.26. Refer to Plastic hardness Problem 1.22.

a. Set up the ANOVA table.

b. Test by means of an *F* test whether or not there is a linear association between the hardness of the plastic and the elapsed time. Use *a* = .01. State the alternatives, decision rule, and conclusion.

**Analysis of Variance**

**Source DF Adj SS Adj MS F-Value P-Value**

**Regression 1 5297.51 5297.51 506.51 0.000**

**Xi 1 5297.51 5297.51 506.51 0.000**

**Error 14 146.43 10.46**

**Lack-of-Fit 2 17.67 8.84 0.82 0.462**

**Pure Error 12 128.75 10.73**

**Total 15 5443.94**

1. Hypothesis

2. Test statistic

3. Decision:

p-value=0.000<0.01

, then we reject .