**جامعة الملك سعود الاختبار النهائي**

**كلية العلوم الفصل الدراسي الأول 1436 / 1437**

**قسم الإحصاء وبحوث العمليات مقرر 105 احص**

**24 / 3 /1436 هـ الساعة : 8-11**

**اسم الطالبة : -----------------------------------------------------------------------------------**

**رقم الطالبة : -----------------------------------------------------------------------------------**

**رقم الشعبة : 29659 رقم التسلسل : ---------------------------------------**

**أستاذة المقرر : وئام الهدلق**

**ملاحظة :**

* **سيتم التصحيح من الورقة الخارجية فقط ولن يتم النظر إلى ورقة الإجابة من الداخل.**
* **التأكد من صحة النقل مسؤولية الطالبة**
* **تأكدي أن عدد الصفحات مع الغلاف 8**
* **بعض القوانين الأساسية موجوده في الصفحة 8**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Question* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Answer* |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Question* | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| *Answer* |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Question* | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| *Answer* |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Question* | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| *Answer* |  |  |  |  |  |  |  |  |  |  |

1. Suppose we get the estimated regression line as $\hat{y}=3+5x,$ If $x=14$ then the predicted value for y is $\hat{y}\_{\*}=$

A) 14 B) 73 C) 8 D) 54

1. If for a fixed value x for an independent variable X there is a fixed value y for a dependent variable Y, we call the relationship

A) Deterministic B) Non deterministic

C) Linear D) Non linear

**Use the following information to answer the questions from 4 to 10**

A firm wishes to compare three programs for training workers to perform a certain manual task. 9 new employees are randomly assigned to the training programs, with 3 in each program. At the end of the training period, a test is conducted to see how quickly trainees can perform the task. The number of times the task is performed per minute is recorded for each trainee, with the following results.

|  |  |  |  |
| --- | --- | --- | --- |
| Observations | 1 | 2 | 3 |
| Program 1 | 9 | 12  | 14 |
| Program 2 | 10 | 6 | 9  |
| Program 3 | 12 | 14 | 11 |

Test whether the three programs have the same effect (the three means are equal)

1. The Hypotheses are

A) $\begin{matrix}H\_{0}:μ\_{1}=μ\_{2}=μ\_{3}\\H\_{a}:μ\_{1}\ne 0 \end{matrix}$ B) $\begin{matrix}H\_{0}:μ\_{1}=μ\_{2}=μ\_{3} \\H\_{a}:At least one μ\_{i} is different\end{matrix}$

C) $\begin{matrix}H\_{0}:μ\_{1}\ne μ\_{2}\ne μ\_{3}\\H\_{a}:μ\_{1}\ne 0 \end{matrix}$ D)$\begin{matrix}H\_{0}:μ\_{1}=μ\_{2}=μ\_{3} \\H\_{a}:μ\_{1}\ne μ\_{2}\ne μ\_{3} \end{matrix}$

Complete the shaded areas in table below then answer from 5 to 9

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source of Variation** | $$df$$ | **SS** | **MS** | $$f$$ |
| **Treatments** | Q5 | Q7 |  | Q9 |
| **Error** | 6 |  |  |  |
| **Total** | Q6 | Q8 |  |  |

1. The degrees of freedom (df) for the Treatments

A) 1 B) 2 C) 3 D) 9

1. The degrees of freedom (df) for the Total

A) 8 B) 2 C) 12 D) 6

1. $SST\_{r}=$

A) 4.33 B) 53.56 C) 27.56 D) 26

1. $SST=$

A) 4.33 B) 53.56 C) 27.56 D) 26

1. The test statistic $f=$

A) 13.721 B) 3.18 C) 0.114 D) 4.333

1. Use $f\_{0.05}=5.14$. Hence, the decision is

A) Cannot reject $H\_{0}$ B) Reject $H\_{0}$

C) Reject both $H\_{0}\&H\_{a}$ D) we cannot say

**Use the following information to answer the questions from 11 to 18**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **X Values** | **Y Values** |  |  |  |
| 95 | 85 |  |  |  |
| 85 | 95 |  |  |  |
| 80 | 70 |  |  |  |
| 70 | 65 |  |  |  |
| 60 | 70 |  |  |  |

1. The estimated regression line $\hat{y}=b\_{0}+b\_{1}x$ is

A) $26.8+0.644 x$ B) $22 + 3.04 x$

C) $0.05 + 0.1878 x$ D) $3.85 x$

1. We call $b\_{1}$ the

A) Intercept B) Strength C) Correlation D) Slope

1. The first residual $y\_{1}-\hat{y}\_{1}$ is

A) -0.208 B) 0.471 C) 1.02 D) -2.98

1. The correlation coefficient is

A) 0.91 B) 0.73 C) 0.43 D) 0.85

1. The strength of the relation

A) No relation B) Weak C) Moderate D) Strong

1. The relation is

A) Positive B) Negative

C) Non linear D) Non of these

1. The coefficient of determination is

A) 0.23 B) 0.48 C) 0.99 D) 0.74

**Use the following information to answer question 19**

The linear regression model was fitted for the data below then the residuals were calculated.

|  |  |  |
| --- | --- | --- |
| **Hours Spent Studying (X)** | **Math Score (Y)** | **Residuals**($y-\hat{y}$) |
| 50 | 122 | 4.339391 |
| 53 | 118 | -4.89187 |
| 54 | 128 | 3.36438 |
| 55 | 121 | -5.37937 |
| 56 | 125 | -3.12313 |
| 59 | 136 | 2.645616 |
| 62 | 144 | 5.414357 |
| 65 | 142 | -1.8169 |
| 50 | 122 | 4.339391 |
| 53 | 118 | -4.89187 |

1. The estimate of $σ^{2}$ (The amount of variability inherent in the regression model) is

A) 9.3 B) 10.5 C) 17.2 D) 21.9

**Use the following output to answer the questions from 20 to 23**

 Analysis of Variance

Source DF Adj SS F-Value

FactorA 2 3629.2 12.83

FactorB 3 1116.9 2.63

Error 6 848.8

Total 11 5594.9

1. The **MSE** equal to

A) 372.3 B) 141.5 C) 1814.6 D) 671.7

1. The number of observations

A) 3 B) 4 C) 7 D) 12

1. The test statistic $F\_{A}=$

A) 12.83 B) 2.63 C) 0.145 D) 848.8

1. The decision of testing: $\left\{\begin{array}{c}H\_{0A}:μ\_{1}=μ\_{2}=μ\_{3} \\\begin{matrix} \\H\_{aA}:At least one mean is different\end{matrix}\end{array}\right.$ (Use $F\_{0.05,2,6}=5.14$)

A) Reject $H\_{0A}$ B) Cannot reject $H\_{0A}$

C) Reject both $H\_{0A} \& H\_{aA}$ D) We cannot say

**Use the following information to answer the questions from 34 to 37**

Consider a standard package of milk chocolate M&Ms. There are four different colors: red, yellow, green and blue. Suppose that we have a simple random sample of 400 M&M candies with the following quantities:

50 of the candies are **red**, 47 of the candies are **yellow**, 102 of the candies are **green** and 201 of the candies are **blue**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Color | Red  | Yellow | Green  | Blue | Total |
| $$n\_{i}$$ | 50 | 47 | 102 | 201 | 400 |
| $$np\_{i0}$$ |  |  |  |  |  |

Use Chi-square goodness of fit to test if all four colors occur in equal proportions?

1. The hypotheses are

A) $\begin{matrix}H\_{0}:p\_{10}=p\_{20}=p\_{30}=p\_{40} \\H\_{a}:At least one p\_{i0} is different\end{matrix}$ B) $\begin{matrix}H\_{0}:p\_{10}=p\_{20}=p\_{30}=p\_{40}\\H\_{a}:p\_{10}=0 \end{matrix}$

C) $\begin{matrix}H\_{0}:p\_{10}=p\_{20}=p\_{30}=p\_{40}\\H\_{a}:p\_{10}\ne p\_{20}\ne p\_{30}\ne p\_{40}\end{matrix}$ D) $\begin{matrix}H\_{0}:p\_{10}=p\_{20}=p\_{30}=p\_{40}\\H\_{a}:p\_{30}\ne p\_{40} \end{matrix}$

1. The expected number of the red candies is

A) 60 B) 300 C) 40 D) 100

1. The test statistic $χ^{2}=$

A) 143 B) 400.2 C) 155.14 D) 210.7

1. The decision (Use $χ\_{0.05,3}^{2}=7.815$)

A) Reject $H\_{0}$ B) Cannot reject $H\_{0}$

C) Reject both $H\_{0} \& H\_{a}$ D) We cannot say

**Use the following output to answer the questions from 38 to 40**

For testing the independence between the Gender and Voting preferences we have the following output

Rows: Worksheet rows Columns: Worksheet columns

 C1 C2 C3 All

1 200 150 50 400

 180 180 40

2 250 300 50 600

 270 270 60

All 450 450 100 1000

Pearson Chi-Square = 16.204; DF = 2; P-Value = 0.000

1. The estimated expected value $\hat{e}\_{11}=$

A) 270 B) 60 C) 180 D) 450

1. The test statistic $χ^{2}=$

A) 2 B) 16.204 C) 600 D) 0

1. The decision is (use $χ\_{0.025,2}^{2}=7.378$)

A) Reject $H\_{0}$ B) Cannot reject $H\_{0}$

C) Reject both $H\_{0} \& H\_{a}$ D) We cannot say