**Decision Science**

**June 2023 Examination**

**Q 1: Bad gums may mean a bad mood. Researchers discovered that 85% of people who have suffered a bad mood had periodontal disease, an inflammation of the gums. Only 29% of healthy people have this disease. Suppose that in a certain community bad moods are quite rare, occurring with only 10% probability. If someone has periodontal disease, what is the probability that he or she will have a bad mood? (10 Marks)**

**Note: Draw the tree diagram for the above problem. Handwritten tree diagram is prohibited.**

**Answer 1:**

**Introduction**

A tree diagram is a graphic representation of connections that begins with the central node, or "trunk," of the figure. This is the issue that has to be resolved or the concept you are researching. Every solution or scenario has a distinct "branch" that emerges from the trunk on the top or bottom right-hand side. From each of these "second layer branches," more decisions, repercussions, or effects diverge, giving the diagram a tree-like structure.

We can use the following guidelines to draw a tree diagram:

It is only half solved

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**Q 2: Using MS-EXCEL show the Regression model, consider ‘Instagram followers’ as dependent variable and ‘no f post per day’ as an independent variable. Write the interpretation of EXCEL Tables. Write the conclusion on the fitting of your model also.**

**(10 Marks)**

|  |  |
| --- | --- |
| **no of****followers** | **no of****post****per day** |
| **439** | **2** |
| **340** | **1** |
| **315** | **4** |
| **444** | **5** |
| **377** | **2** |
| **456** | **5** |
| **495** | **2** |
| **304** | **2** |
| **401** | **5** |
| **305** | **5** |
| **338** | **4** |
| **348** | **2** |
| **402** | **1** |
| **395** | **5** |

**Answer 2**

**Introduction**

Regression analysis is a group of techniques for determining the significance of an independent variable's influence on the dependent variable. Additionally, it calculates the magnitude of the change in the dependent variable when the independent variable changes, as well as the link between the dependent and independent variables encounters a change. Additionally, it offers forecasting, projection, and prediction. Excel can be used in a variety of ways when performing regression analysis. You can tell simply looking at:

1. Using the formula for linear regression demands a solid grasp of theoretical statistical

**Q 3A): 1000 light bulbs with a mean life of 120 days are installed in a new factory and their length of life is normally distributed with standard deviation of 20 days.**

**If it is decided to replace all the bulbs together, what interval should be allowed between replacements if not more than 10% should expire before replacement? (5 Marks)**

**Note: You are not supposed to use EXCEL or any other software to write this answer.**

**Answer (3a)**

**Introduction**

Given:

Mean life of light bulbs (μ) = 120 days

Standard deviation (σ) = 20 days

Number of light bulbs (n) = 1000

Percentage of bulbs that should not expire before replacement = 90% = 0.9

We need to find the interval between replacements such that not more than 10% of the bulbs

**Q 3B): calculate the average age of migrants for both the categories of gender and write your interpretation. (5 Marks)**

|  |  |  |
| --- | --- | --- |
| **Age****group** | **Male** | **Female** |
| **0-4** | **98,34,738** | **91,27,975** |
| **5-9** | **1,09,59,506** | **99,58,059** |
| **10-14** | **1,24,25,108** | **1,14,51,227** |
| **15-19** | **1,26,83,733** | **1,65,18,666** |
| **20-24** | **1,31,97,283** | **3,36,58,466** |
| **25-29** | **1,30,45,214** | **3,75,22,017** |
| **30-34** | **1,21,34,009** | **3,42,86,096** |
| **35-39** | **1,20,60,030** | **3,30,54,887** |
| **40-44** | **1,09,00,143** | **2,72,61,236** |
| **45-49** | **97,04,026** | **2,34,47,716** |
| **50-54** | **79,40,152** | **1,78,42,986** |
| **55-59** | **61,61,754** | **1,51,92,910** |
| **60-64** | **54,01,736** | **1,43,47,372** |
| **65-69** | **36,87,082** | **1,01,41,196** |
| **70-74** | **26,62,421** | **70,33,728** |
| **75-79** | **13,41,572** | **34,93,001** |
| **80-85** | **14,61,296** | **42,53,695** |

**Note: You are not supposed to use EXCEL or any other software to write this answer**

**Answer 3b**

**Introduction**

You can determine what age most of the group members most closely resemble by calculating their average age. This statistic has uses in a variety of industries. For instance, you could determine a team's average age to determine if its members are young or elderly, or you could determine a class' average age to determine how