**Tesk3 10Questions**

Q1

reference1 EXAMPLE 13.4.3

**What is the best way to culture (grow) bacteria so that a patient with an infection can be diagnosed and treated correctly? Researchers designed an experiment to try five different concentrations of tryptone, a nutrient for the bacteria. They randomly assigned six dishes with a form of Staphylococcus aureus to each of the concentrations. At the end of the experiment, the researchers counted the number of colony-forming units (CFUs) in each dish.**

**Is there convincing evidence at the 5% level that at least one of the concentrations of tryptone produces a different median number of CFUs of this type of bacteria? To help answer this question, perform the appropriate Kruskal-Wallis test.**

**0.6% : 10 129 93 146 42 118**

**0.8% : 26 145 98 217 108 99**

**1.0% : 50 156 89 269 96 141**

**1.2% : 52 243 149 284 131 234**

**1.4% : 47 178 113 186 121 172**

Ans:

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Q2

referece1 Chapter 12 Review Exercises Q1

**Which factors affect the number of calories in cheese? We selected a sample of 18 types of sliced cheese and recorded several variables for each. Here is the multiple regression model relating calories to saturated fat (g) and protein (g) in a single serving:**

**calories^ = 7.2629 + 12.9850 sat fat + 3.8457 protein**

**a. Predict the price for a sliced cheese with 1.5 g of saturated fat and 7 g of protein.**

**b. The actual number of calories for the cheese in part (a) is 50. Calculate and interpret the residual for this cheese.**

**c. For this model, s = 4.46 and R2= 0.760 . Interpret these values.”**

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Ans:

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Q3

referece1 Chapter 9 Review Exercises Q7

**An investor is comparing the volatility of two stocks, A and B. She wants to know if there is a difference in the variability in return on investment for these two stocks as measured by the percent increase or decrease in the price of the stock from its date of purchase. The investor takes a random sample of 50 annualized daily returns over the past 5 years for each stock. Graphs of the data suggest that it is reasonable to believe that the corresponding population distributions are normal. Here are summary statistics for the daily returns of each stock:**

**StockA: Mean:11.8% SD:12.9%**

**StockB: Mean:7.1%. SD:9.6%**

**Do the data provide convincing evidence of a difference in the standard deviations of the daily returns of these two stocks at the α = 0.01 significance level?**

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Q4:

referece1 Chapter6.7 Exercise Q15

**Motorcycle Ownership In the United States, 8% of households own a motorcycle. You plan to send surveys to an SRS of 500 households. Let p^ be the proportion of households in the sample that own a motorcycle.**

**a. Describe the shape, center, and variability of the sampling distribution of** **p^ .**

**b. Find the probability that more than 10% of the households in the sample own a motorcycle.**

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Q5

referece1 Chapter7.2 Ex Q25

**According to a recent Current Population Survey from the U.S. Census Bureau, 89.8% of adult U.S. residents have earned a high school diploma. Suppose we select a random sample of 120 American adults and record the proportion of individuals in our sample who have a high school diploma.**

**a. Describe the shape, center, and variability of the sampling distribution of p^**

**b. Find the probability that the sample proportion of residents who have earned a high school diploma in a random sample of 120 residents is at least 0.95.**

**c. If the sample size was 20, it would not be appropriate to use a normal distribution to perform probability calculations. Instead, use a binomial distribution to estimate the probability that the sample proportion is at least 0.95 in a sample of size 20.**

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Q6

referece1 19.1 Exercises Q23

**Jelly Beans A candy maker offers child- and adult-size bags of jelly beans containing different color mixes. The company claims that the child mix has 30% red jelly beans, while the adult mix contains 10% red jelly beans. Assume that the candy maker’s claim is true. Suppose we take a random sample of 50 jelly beans from the child mix and a separate random sample of 100 jelly beans from the adult mix. Let p^C and p^A be the sample proportions of red jelly beans from the child and adult mixes, respectively.**

**a. What is the shape of the sampling distribution of p^C-p^A? Why?**

**b. Find the mean of the sampling distribution.**

**c. Calculate the standard deviation of the sampling distribution.**

**d. Find the probability that the proportion of red jelly beans is greater in the sample from the child mix than in the sample from the adult mix.**

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Q7

referece2 Chapter12 Q127

**In biofiltration of wastewater, air dis- charged from a treatment facility is passed through a damp porous membrane that causes contaminants to dissolve in water and be transformed into harmless products. The accompanying data on x = inlet tem- perature (°C) and y = removal efficiency (%) was the basis for a scatterplot that appeared in the article “Treatment of Mixed Hydrogen Sulfide and Organic Vapors in a Rock Medium Biofilter” (Water Environ. Res. 2001: 426–435).**

**obs1-Temp: 7.68, Removal %: 98.09**

**obs2-Temp: 6.51, Removal %: 98.25**

**obs3-Temp: 6.43, Removal %: 97.82**

**obs4-Temp: 5.48, Removal %: 97.82**

**obs5-Temp: 6.57, Removal %: 97.82**

**obs6-Temp: 10.22, Removal %: 97.93**

**obs7-Temp: 15.69, Removal %: 98.38**

**obs8-Temp: 16.77, Removal %: 98.89**

**obs9-Temp: 17.13, Removal %: 98.96**

**obs10-Temp: 17.63, Removal %: 98.90**

**obs11-Temp: 16.72, Removal %: 98.68**

**obs12-Temp: 15.45, Removal %: 98.69**

**obs13-Temp: 12.06, Removal %: 98.51**

**obs14-Temp: 11.44, Removal %: 98.09**

**obs15-Temp: 10.17, Removal %: 98.25**

**obs16-Temp: 9.64, Removal %: 98.36**

**obs17-Temp: 8.55, Removal %: 98.27**

**obs18-Temp: 7.57, Removal %: 98.00**

**obs19-Temp: 6.94, Removal %: 98.09**

**obs20-Temp: 8.32, Removal %: 98.25**

**obs21-Temp: 10.50, Removal %: 98.41**

**obs22-Temp: 16.02, Removal %: 98.51**

**obs23-Temp: 17.83, Removal %: 98.71**

**obs24-Temp: 17.03, Removal %: 98.79**

**obs25-Temp: 16.18, Removal %: 98.87**

**obs26-Temp: 16.26, Removal %: 98.76**

**obs27-Temp: 14.44, Removal %: 98.58**

**obs28-Temp: 12.78, Removal %: 98.73**

**obs29-Temp: 12.25, Removal %: 98.45**

**obs30-Temp: 11.69, Removal %: 98.37**

**obs31-Temp: 11.34, Removal %: 98.36**

**obs32-Temp: 10.97, Removal %: 98.45**

**Calculated summary quantities are Σxi=384.26,Σyi=3149.04,Sxx=485.00,Sxy=36.71, Syy​=3.50.**

**a. Does a scatterplot of the data suggest appropriateness of the simple linear regression model?**

**b. Fit the simple linear regression model, obtain a point prediction of removal efficiency when temperature = 10.50, and calculate the value of the corre- sponding residual.**

**c. Roughly what is the size of a typical deviation of points in the scatterplot from the least squares line?**

**d. What proportion of observed variation in removal efficiency can be attributed to the model relationship?**

**e.Estimate the slope coefficient in a way that conveys information about relia- bility and precision, and interpret your estimate.**

**f.Personal communication with the authors of the article revealed that one additional observation was not included in their scatterplot: (6.53, 96.55). What impact does this additional observation have on the equation of the least squares line and the values of s and R2?**

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Q8

referece1 Chapte10r EXAMPLE 10.6.2

**Researchers studying a small type of insect called an aphid were interested in the relationship between aphids and different types of host plants. As part of the study, the researchers measured the amount of “honeydew” (aphid waste—not related to honeydew melons) produced by aphids on independent random samples of three different types of host plants (Trifolium, Pisum, and Medicago). Is there convincing evidence at the α=0.05\alpha = 0.05α=0.05 significance level of at least one difference in the mean amount of honeydew produced by aphids on these three types of plants?**

* **Trifolium: 1.08, 2.21, 2.63, 1.63, 3.51, 2.53, 2.92, 0.98, 2.39, 2.05, 0.36, 0.74, 1.00, 0.79, 0.55, 1.05, 1.46, 1.09**
* **Pisum: 1.03, 2.48, 1.31, 4.33, 2.33, 2.68, 3.34, 2.46, 2.74, 5.83, 0.89, 1.69, 1.52, 2.87, 3.54, 3.76, 1.96**
* **Medicago: 1.06, 0.88, 1.87, 1.42, 0.39, 1.20, 0.39, 1.41, 0.88, 0.59, 1.08, 2.71, 1.63, 2.98, 2.94, 2.43, 2.34**

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Ans:

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Q9

referece2 Chapter12 Q135

**Forest growth and decline phenomena throughout the world have attracted con- siderable public and scientific interest. The article “Relationships Among Crown Con- dition, Growth, and Stand Nutrition in Seven Northern Vermont Sugarbushes” (Canad. J. Forest Res. 1995: 386–397) included a scatterplot of y = mean crown dieback (%), one indicator of growth retardation, and x = soil pH (higher pH corresponds to less acidic soil), from which the following observations were taken:**

**x: 3.3 3.4 3.4 3.5 3.6 3.6 3.7 3.7 3.8 3.8**

**y: 7.3 10.8 13.1 10.4 5.8 9.3 12.4 14.9 11.2 8.0**

**x: 3.9 4.0 4.1 4.2 4.3 4.4 4.5 5.0 5.1**

**y: 6.6 10.0 9.2 12.4 2.3 4.3 3.0 1.6 1.0**

**a.Construct a scatterplot of the data. What model is suggested by the plot?**

**b.Use a statistical software package to fit the model suggested in (a) and test its utility.**

**c.Use the software package to obtain a prediction interval for crown dieback when soil pH is 4.0, and also a confi- dence interval for expected crown die- back in situations where the soil pH is 4.0. How do these two intervals com- pare to each other? Is this result con- sistent with what you learned in simple linear regression? Explain.**

**d.Use the software package to obtain a PI and CI when x = 3.4. How do these intervals compare to the corresponding intervals obtained in (c)? Is this result consistent with what you learned in simple linear regression? Explain.**

Ans:

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Q10

referece2 Chapter3 Q65

**When circuit boards used in the manufac- ture of DVD players are tested, the long-run percentage of defectives is 5%. Let X = the number of defective boards in a random sample of size n = 25, so X ～Bin(25, .05).**

**a.Determine P(X≤2)P(X \leq 2)**

**b.Determine P(X≥5)P(X \geq 5)**

**c.Determine P(1≤X≤4)P(1 \leq X \leq 4)**

**d.What is the probability that none of the 25 boards is defective?**

**e.Calculate the expected value and stan- dard deviation of X.**

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Ans:

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