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*MET CS 555*

*March 2nd, 2022*

Assignment 3

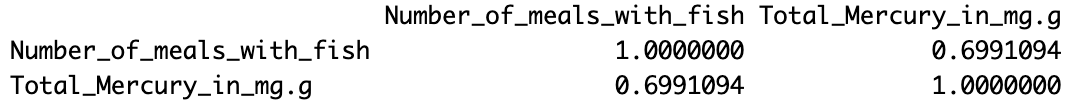
(1) To get a sense of the data, generate a scatterplot (using an appropriate window, label the axes, and title the graph). Consciously decide which variable should be on the x-axis and which should be on the y-axis. Using the scatterplot, describe the form, direction, and strength of the association between the variables. (4 points)

Chart, scatter chart

Description automatically generated

Based on the picture, we can see that the Number of Meals with Fish vs. Mercury Levels has a linear relation. The mercury level will increase when the number of fish consumed increases.

(2) Calculate the correlation coefficient. What does the correlation tell us? (2 points)



The correlation is around 0.699, which means there is a very low correlation between fish-eating and mercury levels.

(3) Find the equation of the least squares regression equation and write out the equation. Add the

regression line to the scatterplot you generated above. (2 points)

Chart, scatter chart

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Sx and Sy are standard deviations of the number of fish-eating and mercury levels. Xbar and ybar are the means of the number of fish-eating and mercury levels.

𝛽0 is 1.6876 and 𝛽1 is 0.2759

Equation is: y = 0.275x + 1.687

(4) What is the estimate for 𝛽1? How can we interpret this value? What is the estimate for 𝛽0? What is the interpretation of this value? For the interpretations, you should be interpreting them in the context of this specific data set. (4 points)

Text, letter

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The estimate for 𝛽1 is 0.276; this means that whenever a fisherman eats a fish, the avg. level of mercury in his body increases by 0.276mg. The estimate for 𝛽0 is 1.688; this means the avg. level of mercury in those fishermen who do not eat fish.

(5) Calculate the ANOVA table AND the table which gives the standard error of 𝛽1. Formally test the hypothesis that 𝛽1= 0 using either the F-test or the t-test at the 𝛼 = 0.05 level. Either way, present your results using the 5-step procedure, as described in the course notes. Within your conclusion, calculate the R-squared value and interpret this. Also, calculate (using R) and interpret the 90% confidence interval for 𝛽1. (8 points)

**Step 1: α = 0.05**

H0 : 𝛽1 = 0 there is no linear association

H1 : 𝛽1 ≠ 0 there is a linear association

**Step 2:**

98 degrees of freedom

**Step 3:**

Icon

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**Step 4:**

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F value here is 93.689.

**Step 5: Conclusion**

Since F value is greater than 3.938, we reject H0, which means that there is a linear relation between fish-eating and mercury levels.



The R-squared value is 0.488.

Text

Description automatically generated with medium confidence

The 90% confidence interval for 𝛽1 is 0.323; which means the mercury in 90% of fishermen's bodies increases by about 0.229 to 0.323 when they eat another fish.