

MTH 3220 Lab 8 Answer Sheet

Due Thu., Nov. 7

1 Part A

1.1 Yellowstone Lake Data Set

1. NA
2. *Don't* print the plot. Just answer the following question.

Based on the time series plot, does there appear to be any discernible trend (increasing or decreasing) in the **maximum daily outflow** of Yellowstone Lake over the years 1926 - 2001 (Yes/No)?

3. NA
4. Give the following values:

The estimate of β_0 is $\hat{\beta}_0 =$

The estimate of β_1 is $\hat{\beta}_1 =$

The estimated standard error of $\hat{\beta}_1$ is $s_{\hat{\beta}_1} =$

The observed value of the test statistic for the t test of

$$H_0 : \beta_1 = 0$$

$$H_a : \beta_1 \neq 0$$

is $t =$

The p-value =

Is the observed $\hat{\beta}_1$ statistically significantly different from zero (Yes/No)?

What does this indicate about whether there's any systematic trend in the **maximum daily outflow** of Yellowstone Lake over the years 1926 - 2001?

Give the value of the *coefficient of determination* r^2 (labeled Multiple R-squared in the output from `summary()`).

Coefficient of determination $r^2 =$ _____

Based on the value of r^2 , what percentage of the variation in **maximum daily outflow** of Yellowstone Lake over the years 1926 - 2001 is explained by **year**? _____

5. NA (*don't* print the time series plot).

6. *Don't* print the histogram of the residuals. Just answer the following question.

Does the normality assumption appear to be met (Yes/No)? _____

7. *Don't* print the plot of the residuals versus fitted values. Just answer the following question.

Does the constant standard deviation assumption appear to be met (Yes/No)? _____

8. From the regression ANOVA table, give the values of the following statistics:

SSR = _____ SSE = _____ SST = _____
MSR = _____ MSE = _____ F Test Statistic = _____

Give the degrees of freedom for SSR: _____

Give the degrees of freedom for SSE: _____

Give the degrees of freedom for SST: _____

Show that the F test statistic is the square of the t statistic from Step 4, and confirm that the p-values for the two tests are the same.

2 Part B

2.1 Yellowstone Lake Data Set (Continued)

1. *Don't* print the plot. Just answer the following question.

Based on the time series plot, does there appear to be any discernible trend (increasing or decreasing) in the **maximum daily elevation** of Yellowstone Lake over the years 1926 - 2001 (Yes/No)?

2. Give the following values:

The estimate of β_0 is $\hat{\beta}_0 =$

The estimate of β_1 is $\hat{\beta}_1 =$

The estimated standard error of $\hat{\beta}_1$ is $s_{\hat{\beta}_1} =$

The observed value of the test statistic for the t test of

$$H_0 : \beta_1 = 0$$

$$H_a : \beta_1 \neq 0$$

is $t =$

The p-value =

Is the observed $\hat{\beta}_1$ statistically significantly different from zero (Yes/No)?

What does this indicate about whether there's any systematic trend in the **maximum daily elevation** of Yellowstone Lake over the years 1926 - 2001?

Give the value of the *coefficient of determination* r^2 (labeled Multiple R-squared in the output from `summary()`).

Coefficient of determination $r^2 =$

Based on the value of r^2 , what percentage of the variation in **maximum daily elevation** of Yellowstone Lake over the years 1926 - 2001 is explained by **year**?

3. NA (*don't* print the time series plot).

4. *Don't* print the histogram of the residuals. Just answer the following question.

Does the normality assumption appear to be met (Yes/No)?

5. *Don't* print the plot of the residuals versus fitted values. Just answer the following question.

Does the constant standard deviation assumption appear to be met (Yes/No)?

6. From the regression ANOVA table, give the values of the following statistics:

SSR = SSE = SST =

MSR = MSE = F Test Statistic =

Give the degrees of freedom for SSR:

Give the degrees of freedom for SSE:

Give the degrees of freedom for SST:

Show that the F test statistic is the square of the t statistic from Step 2, and confirm that the p-values for the two tests are the same.

3 Part C

3.1 Yellowstone Lake Data Set (Continued)

1. *Don't* print the scatterplot. Just answer the following question.

Based on the plot, does there appear to be a relationship between the **maximum daily outflow** and the **maximum daily elevation** of Yellowstone Lake (Yes/No)?

If so, is it a positive or negative relationship?

2. Give the value of the correlation.

Correlation $r =$ -----