

**Instructions:** Answer each question as thoroughly as possible. Round answers to 4 decimal places as needed. Exact answers are best when possible. Be sure to answer all parts of each question.

1. For this problem, you'll need to install the {xts} package. Follow the steps to convert the time series LakeHuron (a built-in dataset in R) to a dataframe. Then perform the indicated analysis.

```
data1 <- as.data.frame(uspop)
data1$times <- rownames(data1)
data1$times <- as.numeric(data1$times)
data1$times <- (data1$times) + 1874
data1
```

- Plot the data in ggplot. Paste the graph below. Describe the trend.
- Use `geom_smooth()` to plot a LOESS model to the data. Paste the graph below.
- Find the mean. Create a new column of levels measured from the mean. And replot with a linear model. *mean = 579.*
- Write the equation of the resulting model. Is the slope significant? Does the linear model agree with the trend from `decompose()`? *Slope & intercept are significant*
- Compare the results. Which model appears to match the data most closely? Why? Which model do you prefer and under what circumstances?

d. *decompose fails since no seasonal pattern  
The linear trend only partially agrees w/ Loess  
trend. Both decrease through early 1930s or 40s  
but Loess trend then increases*

e. *the Loess model does better over time:*



