

## CLT1: Review Problems

You are advised to work on these problems before you take the Homework assessment of this week (due **Wednesday at 10pm**). You are encouraged to work with your friends or ask questions to the TAs / instructors as needed, while you work on these problems; however, the HW assessment must be individual work.

Solving these problems and understanding the concepts will help you achieve the weekly learning objectives, and do better in the Homework assessment and the exams.

### Week 1: Why is there a “Climate Debate?” How to interpret data.

#### Check your learning: Can you....

***Given a time dependent data, draw the best fitting line and apply this analysis to published data on Earth's temperature variations to assess if climate is changing***

1. Given a time dependent data, make a data vs. time plot or given a time plot of a data, find the best-fitting line using spreadsheet software and comment on the quality of the data based on the correlation coefficient.
2. Given the findings of various studies, find the conflicting data and use them to make an argument for global warming.
3. Given the effects of parameters on the outcome of an experiment, be able to determine the correlation or causation between two parameters.

*The answers to the numerical questions are found at the bottom*

1. Choose one of the following articles and read it. Discuss in your own words if there is causation or correlation between the factors that are studied.

(i) relation between cancer and eating pizza <http://news.bbc.co.uk/2/hi/health/3086013.stm>

(ii) relation between luck and being born in summer <http://news.bbc.co.uk/2/hi/health/3622817.stm>

2. Temperature changes in a lake has been recorded for two years to study the impact of a nearby chemical plant. In this time frame, number of organisms in the lake has also been recorded (see the Table below).

| Time (months) | Temperature (°C) | # of organisms |
|---------------|------------------|----------------|
| 2             | 18.3             | 1200           |
| 4             | 18.4             | 2100           |
| 6             | 18.3             | 2300           |
| 8             | 18.6             | 2500           |
| 10            | 18.7             | 4500           |
| 12            | 18.6             | 5500           |
| 14            | 18.9             | 5800           |
| 16            | 19.5             | 7000           |
| 18            | 20               | 12000          |
| 20            | 21               | 13200          |

**You will use Google Sheets for this question, as you did in the recitation.**

a) Using Google Sheets, write down the time and number of organism readings in different columns and plot the number of organisms as a function of time. (You should select the chart type “Scatter”)

Guess the functional form for the graph (linear, exponential or logistic).

b) As you did in the recitation, use the “trendline” functions of Google Sheets and select the functional form you guessed in (a). Also, in the “Label” section, select “Use equation” to display the equation for the function of your choice. What is the equation displayed for the graph?

c) Assume that population of the organisms will grow forever with the trend you’ve found in part b (independent from outside temperature), then predict the number of organisms at 30th month. (# of organisms = 3.77E4)