

ECE 376 - Homework #8

Statistics. Due Monday, October 23rd

1) The resistance of five thermistors were measured at room temperature.

- What is the 90% confidence interval for the resistance of the next thermistor you measure?
- What is the 90% confidence interval for the entire population of thermistors?

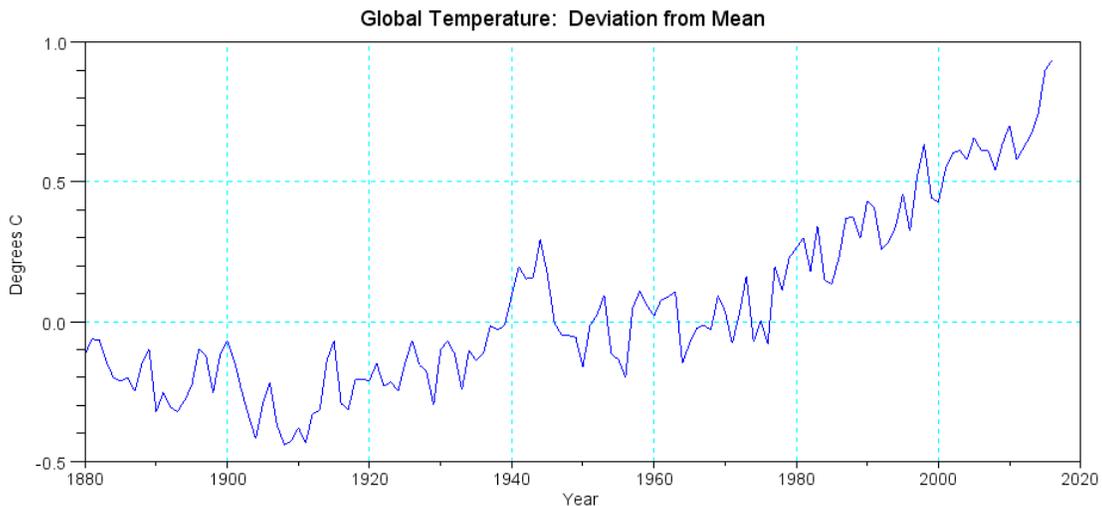
Data: 1490 1526 1521 1286

2) The resistance of 50 thermistors were measured (on-line file Termistor.txt)

- What is the 90% confidence interval for the resistance of the next thermistor you measure?
- What is the 90% confidence interval for the entire population of thermistors?

3) Which answer is correct? Problem 1 or problem 2?

Global temperatures have been monitored by NOAA ever since 1880. The deviation in global temperatures from the mean are shown below



source: https://www.ncdc.noaa.gov/cag/time-series/global/globe/land_ocean/p12/12/1880-2016.csv
Data is also on-line on BisonAcademy

Over the first 100 years, this data has the following statistics

- Mean = -0.110 C
- St Dev = 0.1615 C

4) 2016 was +0.936 degrees. What is the probability that this is due to chance?

5a) What is the probability that any given year is +0.5C or more?

5b) The last 16 years in a row where the temperature deviation is +0.5C or more. What is the probability that this is due to chance?

6) The following code generates a random number in the range of 1..6 (a six-sided die). Is this a fair die? Justify your answer.

7) Remove the comments to create a loaded 6-sided die which

- Is 'fair' 95% of the time,
- Outputs the number 4 5% of the time.

Can you detect that this is a loaded die? Justify your answer.

```
while(1) {  
  
    while(!RB0);  
    while(RB0) {  
        d6 = (d6 + 1) % 6;  
        d20 = (d20 +1) % 20;  
    }  
  
    d6 = d6 + 1;    // range 1..6  
  
// Loaded Die  
//    if(d20 == 0) d6 = 4;  
  
    LCD_Move(1,8);  LCD_Out(d6, 0);  
  
    SCI_Out(d6, 0);  
  
    while(!TRMT); TXREG = 13;    // carriage return  
    while(!TRMT); TXREG = 10;    // line feed  
  
}
```