

# ECE 376 - Homework #6

A/D Converters, Chi-squared Test - Due Monday, March 3rd

## A/D Conversion

1) Write a C program which

- Uses the A/D converter and a thermistor to measure the temperature of something, and
- Displays on the LCD the temperature in degrees C with a resolution of 0.01C.

Give

- Your C code, and
- The compiled size of your code

2) With your temperature sensor, measure the temperature of four different things. Some suggestions are:

- The temperature of cold tap water
- The temperature of hot tap water
- The temperature of a refrigerator
- The temperature of a freezer
- Other

## Chi-Squared Test

3) Determine experimentally using a chi-squared test whether or not the following C code produces a fair 6-sided die:

```
while(1) {
    while(!RB0);
    while(RB0) DIE = (DIE + 1) % 6;
    DIE += 1;
    LCD_Move(1,0); LCD_Out(DIE, 1, 0);
    SCI_Out(DIE, 1, 0);
    SCI_CRLF();
}
```

4) Determine experimentally using a chi-squared test whether or not the following C code produces a fair 6-sided die:

```
while(1) {
    while(!RB0);
    while(RB0) {
        DIE = (DIE + 1) % 13;
    }
    DIE = (DIE % 6) + 1;
    LCD_Move(1,0); LCD_Out(DIE, 1, 0);
    SCI_Out(DIE, 1, 0);
    SCI_CRLF();
}
```

## Am I Psychic?

5) Write a C program which tests if you're psychic with a 2-sided die:

- Each round, predict the result of a coin toss (0 or 1)
- Press the corresponding button RB0 or RB1.
- When you release the button, a random number is generated (0 or 1)
- If you were right, the PIC records that. Likewise if you were wrong.
- The LCD display displays how many times you were right and wrong.

6) Collect data with your program.

7) Determine the chance that you were not just guessing using a chi-squared test

- Null hypothesis: you are just guessing (correct 50% of the time).