ENGR 121   Homework 8

NOTE: Use engineering format for problems 1 and 2, and use non-engineering format for problems 3 through 5. This is an individual assignment.

1. How much salt would you need to add to 2L of water to have a concentration of 3.5 wt% NaCl? 0.0725kg

2. Salt is mixed with 2.5gal of pure water. What is the mass of salt in grams needed to produce salt water with a concentration of 3%? 293grams

3. Locate the temperature system evaluation sheet on the downloads page.
    a. Review the document to know what to expect for the temperature evaluation. Note: some components (like the LCD) screen will be discussed next class.
    b. Print off and fill out the first page.
    c. When you add and subtract 3σ to the analog value of the setpoint to obtain UCL and LCL, respectively, should you include decimal values? Why or why not?
    d. In your Arduino sketch, what data type should you utilize for the analog values?
    e. When you convert the analog value of UCL and LCL to actual temperature values (using the inverted calibration equation for your thermistor), should you include decimal values? Why or why not?
    f. In your Arduino sketch, what data type should you utilize for the temperature values that are in degrees Celsius?

4. Combine all of the parts listed below into one assembly. Include images of each individual part and show your SolidWorks final assembly from at least two points of view.

    Parts to be created:
    *   the fishtank reservoir with three fittings (inlet, outlet, overflow)
    *   the conductivity sensor with fittings (you don't have to draw the wires, terminals or tubing)
    *   the wooden platform assembly
    *   the 3-way valve (hand sketch is not required since part file was downloaded)
    *   the LCD screen (rough detail of shape is good enough, but use correct measurements)
    *   the Arduino (rough detail of shape is good enough, but use correct measurements)
    *   the pump (it's OK to use your pump assembly from ENGR 120)

5. Finish the assembly of your fishtank system for temperature control as begun in the previous class. This includes installing the following parts:

    a. Pump
    b. Three-way valve
    c. Conductivity sensor
    d. Tubing to complete your flow loop
    e. Switch box and switch, along with the terminal block, barrel jack and wiring
    f. Breadboard
    g. Arduino
    h. Circuit to control the heater