# ME121: Homework 3

# April 27, 2016

## Group Assignment

1. Tabulate and summarize the raw data from calibrating your salinity sensor. The summary table (of raw data) should look like this:

| Wt% NaCl | n | Mean | Standard deviation | Median |
|---|---|---|---|---|
| 0 | | | | |
| 0.05 | | | | |
| 0.10 | | | | |
| 0.15 | | | | |

   where n is the total number of readings for each calibration set. In addition to this tabular data, create a histogram of the raw readings.

2. Complete the electrical power system for the fish tank. At the start of class, the instructor will evaluate your electrical power system according to Checklist 2, which is available on the Homework page of the class web site.


## Individual Assignment

3. Finish fabrication of the wiring harness for your LCD panel. Write an Arduino program that will alternately display your first and last name on the first line of the LCD panel. Bring your Arduino and LCD panel to class and be ready to demonstrate the solution at the start of the class period.

4. Perform a least squares curve fit to the salinity calibration data. In your solution, include a plot of the raw data and curve fit on the same axes. On your written solution list the coefficients of the curve fit to six significant figures. If you include the curve fit on your plot, also list the coefficients on the written solution that your turn in for grading. In other words, don't leave it to the grader to read the tiny print on your plot.

5. Complete the MATLAB program for data reduction of the pump curve: efficiency versus flow rate. Include least squares curve fits for the pump curve, $h = f(Q)$ and efficiency curve, $\eta = f(Q)$. List the coefficients of the curve fits on your solution (not just on the plots).

6. Make a table of mixture measurements for creating one liter of calibration standards of 0.05, 0.10 and 0.15 wt % NaCl. The solution would allow you to fill in the table to the right

| Wt% NaCl | NaCl (g) |
|---|---|
| 0 | |
| 0.05 | |
| 0.10 | |
| 0.15 | |