## University of California, Davis
## Department of Biomedical Engineering

| Fall 2015 | **Probability and Statistics** | **BIM 105** |
|---|---|---|
| David M. Rocke | **for Biomedical Engineers** | **September 24, 2015** |

### Homework Assignment 1, Part 2
*Due October 6, 2015*

1. The article "The Selection of Yeast Strains for the Production of Premium Quality South African Brandy Base Products" (C. Steger and M. Lambrechts, Journal of Industrial Microbiology and Biotechnology, 2000:431–440) presents detailed information on the volatile compound composition of base wines made from each of 16 selected yeast strains. Following are the concentrations of total esters (in mg/L) in each of the wines.

   | | | | |
   |---|---|---|---|
   | 284.34 | 163.01 | 219.55 | 302.95 |
   | 205.34 | 178.72 | 134.39 | 162.79 |
   | 129.38 | 187.81 | 293.28 | 246.02 |
   | 648.38 | 95.14 | 285.24 | 160.41 |

   By hand, not using MATLAB,

   (a) Compute the mean concentration and the median concentration.
   (b) Compute the first and third quartiles of the concentrations.
   (c) Construct a boxplot for the concentrations. What features does it reveal?

2. Use the data from the mini Wright meter that is in the same file `wright.csv` as the data from the standard Wright meter. Compute the five number summary, the mean, the variance, and the standard deviation using MATLAB. Show the MATLAB statements and the exact output.

3. Two methods were studied for the recovery of protein. Thirteen runs were made using each method, and the fraction of protein recovered was recorded for each run. The results are in the file `HW1-1.csv`. Using MATLAB,

   (a) Construct a histogram for the results of each method. To make it easier to compare, force the bins to have width 0.1 each and to span the range 0–1. (In MATLAB, you have to specify the bin centers.)
   (b) Construct comparative (side-by-side) boxplots for the two methods.
   (c) Using the boxplots, what differences can be seen between the results of the two methods?