Homework #2: Accuracy, Precision, Repeatability, Calibration, LabView, and Sub-VI's

1. Install LabView 7.1 on your computer. If you purchased the text with LabView Express Student Edition, you will have the latest level software. If you are strapped for cash, please see Prof. Furman ASAP for an alternative.

2. (15 pts.) Create a sub-VI to convert millimeters to inches.
   - Make the input on the front panel to be a slider, and also show the corresponding digital display.
   - Make the output a dial gage, and also show the corresponding digital display output.
   - Make sure you edit the icon and wire the terminals. Add appropriate documentation about the VI under the Documentation menu pick (File → VI Properties → Documentation category).
   - Verify that you can use your sub-VI in another VI by creating another VI and using your sub-VI in it.
   - Turn in hardcopy showing the Front Panel, Block Diagram, and documentation for your sub-VI, and hardcopy showing the Front Panel of the VI that uses the sub-VI. When you go to print, follow the print wizard and select, ‘Complete documentation’ at the ‘Print contents’ step.

3. (10 pts.) EMfE Prob. 2.23

4. The startup company, SpartanWorks, is going to use the IESF-R-5L load sensor, available from CUI, Inc, [http://www.cui.com/adtemplate_child.asp?c=185711&p=933192&catky=560054&subcatky1=895884&subcatky2=406704] as part of a biomedical product to weigh laboratory mice. You are the responsible engineer on the project.
   a. (6 pts) Look at the graph shown on the data sheet. There are three things that are wrong with it. What are they?
   b. (10 pts.) Your boss hands you one of these sensors and tells you that he needs a calibration curve for it by tomorrow. Your job now depends on getting this data. How would you do it? Sketch up at least one design concept for an approach to calibrate this sensor. (Hand sketches are acceptable. Clear explanation of your design and any additional instrumentation or equipment must be included.)
   c. (2 pts.) What will be the independent variable in the calibration?
   d. (2 pts.) What are its units?
   e. (2 pts.) What will be the dependent variable in the calibration?
   f. (2 pts.) What are its units?
   g. (10 pts.) Describe the procedure (in detail) you would follow to calibrate this sensor. I.e., “Step 1. do this… Step 2. do that….”, etc.