SAN JOSÉ STATE UNIVERSITY
Department of Mechanical and Aerospace Engineering

ME 120 Experimental Methods

Homework #2: Accuracy, Precision, Repeatability, and Calibration

1. (10 pts.) EMfE Prob. 2.14.
2. (15 pts.) EMfE Prob. 2.16
3. (20 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. Imagine that you are the responsible engineer on the project.
   a. (6 pts) Look at the graph and its annotation as shown on the data sheet. There are at least two things that are wrong with it. What are they, and what should be done to correct them?
   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* (in other words an apparatus or physical embodiment for carrying out the actual calibration) 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.