Homework 5: Due February 14th, 2017

First, do these problems. These will be graded for completion.

- 2.2: 6, 15
- If you are solving $Ax = b$ and your $A$ and $b$ are both known to within 0.01%, and $\kappa(A) = 1000$, how accurate do you know your solution $\hat{x}$ is?
- 2.4: 3 (except rework 1.2.20b instead of 1.2.17. The high accuracy you find is only for the solution to the given $Ax = b$. If your spring coefficients or forces are measured incorrectly, you could still have a larger error.)
- 2.5: 7, 12

Then do these problems. These will be graded for correctness.

1. What does $\text{fl}(xy)$ mean? Why do we care about that?
2. Explain the difference(s) between backwards stability and well-conditioned. Also, if you know both, what can you conclude?
3. Explain why it is generally impossible to numerically (i.e., on a computer, using floating point calculations) tell the difference between ill-conditioned and singular matrices.

For additional practice, here are some optional problems. These should not be turned in.

- 2.2: 12, 13
- 2.3: 12
- 2.5: 10