Math 371: Intro to Numerical Algorithms
Final Exam Guidelines

Derivations to know:

1. Proof of the triangle inequality for vector norms

2. Proof that for any $m \times n$ matrix A and $n \times 1$ vector $\vec{x}$, $\|A\vec{x}\| \leq \|A\|\|\vec{x}\|$

3. Proof that if $A\vec{x} = \vec{b}$ is approximated as $A(\vec{x} + \vec{dx}) = \vec{b} + \vec{db}$, then $\frac{\|\vec{dx}\|}{\|\vec{x}\|} \leq k(A)\frac{\|\vec{db}\|}{\|\vec{b}\|}$

4. Derivation of how to get the equations that allow you to find the d_i's in the cubic spline interpolation (for interior nodes)

5. Show that the order of the midpoint and trapezoid quadrature rules are both order 2, but that midpoint is actually more accurate.

6. Show that Euler's method of approximation for first order ODE's is of order 1, and that the implicit trapezoidal method is of order 2.

I highly recommend reviewing all important definitions from a section before trying to do anything else. Remember *reading* (and understanding) is fundamental. You need to know what the questions is asking if you want to be able to answer it. Statements of big theorems or important results would be my next step. *All* prior to trying any practice problems.

You do **not** need to memorize the formula for the cubic interpolation polynomial, IQI, or stuff about the pseudoinverse.

The exam will have 6 questions, of which you will need to do five. Three will be primarily over the most recent material, and the other three will be cumulative.

Let me know if you have further questions!