Follow the instructions below:

1. The exam must be solved individually.

2. Submitting materials retrieved from the internet is plagiarism.

3. Solutions must be in a Jupyter notebook, with a Julia kernel.

4. You may use all Julia code posted on the course web site and your own code.

5. The questions are provided in a Jupyter notebook.
   You may use that notebook to formulate your answers to the questions.

6. Answers must be submitted before, or at the latest at 12:50pm.

7. Submit to gradescope.

8. Answers submitted before noon on Wednesday 4 March will receive homework credit.

9. Every question is worth the same amount of points.

10. During the exam no questions will be answered, so do not ask questions.

Good Luck!

1. Experience has shown that 6% of customers who make reservations for a restaurant with 20 tables do not show up.

   How many more reservations can the restaurant accept and be able to give everybody who shows up a table with 90% confidence?

2. Consider the following transfer function

$$H(z) = \frac{3z - 2}{z^2 - (7/3)z + 2/3}.$$

   Is the filter with this transfer function H stable?

   In your justification of your answer, refer to the definition of a stable filter.

3. Let $f(x) = 7 \exp(4x) + 3 \exp(8x)$.

   Compute a least squares approximation for f using a basis of Chebyshev polynomials.

   How large should the degree of the approximant be for the largest error to be less than 10^{-4} over $[-1, +1]$?

4. Purchasing new equipment for $10,000 will give an annual savings of $800.

   Using annual compounding at an interest rate of 5%,
   how long should this new equipment last to justify its purchase?

5. Describe in one paragraph what you learned from _another_ project presentation.