Econ 525a
Fall 2014
Yale University
Prof. Tony Smith

PROBLEM SET #3

This problem set is due on October 3. You should submit copies of your code along with a brief description, perhaps in the form of graphs or tables, of your findings. You can use any programming language to complete the problems, but I encourage you again to take this opportunity to get familiar with Fortran 90!

1. The purpose of this problem is to replicate the results in the third row of Table 1 in Huggett (1993) (see the syllabus for the exact reference). Calibrate Huggett's model exactly as he does and set $q = 0.9944$. Proceed in steps to verify that this value of q (i.e., the one from the third row of Table 1) clears the bond market.

   (a) Restrict bond holdings to lie on a grid with 200 evenly-spaced points on the interval $[-6, 6]$; call this set of points B. The endowment shock e lies in the set $\{e_l, e_h\}$. Iterate on the Bellman equation to compute the value function at each of the 400 points in the state space $B \times \{e_l, e_h\}$.

   (b) Distribute probability mass uniformly over the state space. Use the decision rule computed in part (a), together with the transition probabilities for e, to update the probability distribution over the state space. Continue iterating until it converges.

   (c) Use the invariant distribution computed in part (b) to calculate total bondholdings in the economy. Is this total zero?

2. Use golden-section search, Newton-Raphson, and Brent's method (without derivative) to compute the maximum of the function $f(x) = \log(x) - x$. Compare the relative speeds of convergence of the three methods. (Code for the first and third methods is available in *Numerical Recipes*.)