Economics 613/614
Fall 2007
Assignment 3

1. Write subroutines which implement **2** of the following 3 methods:

   - Tauchen's method for discretizing an AR(1) process.
   - Tauchen-Hussey's method for discretizing an AR(1) process.
   - Rouwenhurst's method for discretizing an AR(1) process.

   The programs should generate the optimal grid points and the probability transition matrix.

2. Use each of the 2 subroutines you wrote in part (a) to solve the standard stochastic growth model (the one on page 16 of Stockey and Lucas) but where the tfp shock is e^z where z follows an AR(1) process, i.e.,

$$z' = \rho z + \varepsilon$$

   and

$$\varepsilon \sim N(0, \sigma_\varepsilon^2)$$

   by doing value function iteration with linear interpolation on the value function.

3. Find the stationary distribution using **2** of the following 3 methods:

   - iterating on the distribution function
   - iterating on the density function
   - monte carlo method

   How do the methods compare in terms of run-time and programming time (i.e. the amount of time it took you to code them up)

4. Compare the moments of the distribution with their analytical counterparts for the case of log utility and full depreciation. Plot the marginal distributions for capital and tfp along with their analytical counterparts. How do your results depend on the number of points in the z grid, the size of the capital grid used to compute the optimal policy and the size of the capital grid used to compute the stationary distribution? How do they depend on the choice of $k_{\min}$ and $k_{\max}$ (the upper and lower bounds on the capital grid)? How do they depend on the calibration of the AR(1) process for z?