HOMEWORK #2

1. Minimize the function $f(x) = (x - 2)^4$ using the following methods: golden section search, Judd’s “bracketing” method (see p. 94 of *Numerical Methods in Economics*), downhill simplex (or polytope) method, Newton’s method with analytical first and second derivatives, the BFGS (quasi-Newton) method (as described on p. 114 of *Numerical Methods in Economics*). For each method, keep track of the number of functions evaluations required for convergence to within a given tolerance from a given initial condition.

2. Minimize the function defined in Exercise #1 on p. 143 of *Numerical Methods in Economics* using the following methods: downhill simplex (or polytope) method, steepest descent, a method based on coordinate directions (see p. 110 of *Numerical Methods in Economics*), Newton’s method, Newton’s method with line search, and the BFGS (quasi-Newton) method. For each method, keep track of the number of functions evaluations required for convergence to within a given tolerance from a given initial condition.

3. Solve the three-asset portfolio problem described in Section 4.10 of *Numerical Methods in Economics* using the same methods that you used in the second problem on this problem set. (Table 4.11 on p. 136 shows the results using Newton’s method.) Compare the performance of the methods.