Introduction to Financial Engineering and Algorithms Programming Assignment 1 (Spring 2014)

Unless you can provide your own demonstration platform, please specify the programming language you will use and tell the TA. This will be critical for demonstration purpose. The maximum score for this exercise is 100 points.

1. (40 points) Given the bond face value F, maturity T, coupon value C, coupon frequency Q (in years, and will be a multiple of T), and constant risk-free interest rate r, please write a program to tabulate and print the bond value V.

   A sample test data $F = 100$, $T = 2$, $C = 2.5$, $Q = 0.5$, and $r = 1.025\%$ gives a price of 107.843724 for the bond, and if $Q = 0.25$, the price will be 117.74191.

2. (30 points) Do a plot of interest rate r verses the value of the bond. Let the interest rate ($0.5 \leq r \leq 5$) be the x-axis and the value of the bond be the y-axis. For the coupon values, use $C = 0, 1, 2$, thus you will have 3 lines on your plot. Use $F = 100$, $Q = 0.25$ and $T = 2$. Please explain the relationship between the interest rates, the coupon value, and the value of the bond.

3. (30 points) Given a bond price V, bond face value F, maturity T, coupon value C, and coupon frequency Q, please write a program to compute the implied interest rate r.