Exercise Set 4

1. An investment will provide returns of \$15,000 at $t=2$ and \$25,000 at $t=5$. It is priced to yield 6% annual effective.
   (a) What is the price today?
   (b) Find the duration, volatility and convexity of this cash flow.
   (c) Estimate the present value of this cash flow when $i=.061$ using the quadratic approximation based on volatility & convexity.

2. A company must pay a Liability of L due one year from today and 2L due two years from today. The company chooses to use an absolute matching strategy to meet these liabilities by buying a one-year bond with face value \$800 and a two-year bond with face value \$2000. Both bonds have annual coupons, with a coupon rate of r for the one-year bond and 1.25r for the two-year bond. Determine r.

3. A company must pay a benefit of $1,000 to a customer in two-years. To provide for this benefit, the company will buy a one-year and a three-year zero coupon bonds. The one-year spot rate is 8% and the three-year spot rate is 10%. The company wants to immunize itself against small changes in the annual effective interest rate on either side of 10%. What should they invest (today) in the one-year bond and in the three-year bond to achieve Redington immunization. Show that this immunization is achieved.