Homework 1: Fixed Income Securities and Hedging

1. **Validating Bond Pricing with Market Data**: Visit Bloomberg's U.S. Government Bonds page :

   https://www.bloomberg.com/markets/rates-bonds/government-bonds/us on a given day.

   Select the 7 U.S. Treasury bonds listed by maturity (3M, 6M, 1Y, 2Y, 5Y, 10Y, 30Y). Using the yields compute the theoretical price of those bonds using the formulas seen in class. Compare your calculated price with the market price from Bloomberg. Discuss any discrepancies between the calculated and quoted prices. Consider factors such as: Accrued interest, rounding differences, day count conventions (e.g., Actual/Actual, 30/360), market liquidity and demand.

   Observations: use 100$ as face value, coupons are paid semi-annually, the yield is annualized and compounded semi-annually.

2. **Yield with and without inflation:** Plot both the yields for the Treasury bonds and for the TIPS and discuss the difference.

3. **Constructing the Discount Curve from Bond Prices:** Now, visit the website:

   https://www.finra.org/finra-data/fixed-income/treasury-trade.

   Use this website to gather data on 10 Treasury bonds with maturities at 6-month intervals up to 5 years. Apply the bootstrapping method to calculate the discount factors for each maturity. Plot the discount curve and analyze the shape and implications for interest rate expectations.

4. **Duration and Convexity**: Compute the modified duration and the analytical convexity of the bonds in Exercise 1 with maturities (3M, 6M, 1Y, 2Y, 5Y). Using the duration and convexity, compute the approximate percentage change of those bond prices if the yield increases by 0.1. Compare and comment the results.