PSTAT 171. HW 6 (Winter 2021)

`Instruction: Review textbook chapter 6 first. Multiple reading might help. Then try to solve the homework problems quickly.`

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1. Martin Maradiaga was considering two bond offerings for purchase on March 1, 1995. Each had a purchase price of \$10,000. Bond A was an "inflation-adjusted" 4% ten-year \$ 10,000 bond with annual coupons; the coupon payments were to be based on March 1, 1995 dollars so that the inflation-adjusted coupon rate was 4% and the bond would be redeemable at an amount worth \$10,000 in March 1, 1995 dollars. Bond B was a 7% ten-year \$10,000 par-value bond with annual coupons offered by Delta Diagnostics. Which should Mr. Maradiaga purchase if he forecasts that inflation will be at a level rate of 2.75%? Why? If inflation is actually at 2.2%, find the inflation-adjusted yield on each bond.

2. Alicia bought a newly issued \$1,000 20% ten-year bond, redeemable at \$ 1,100 and having yearly coupons. It was bought at a premium with a price of \$1,400. Alicia immediately took a constant amount D from each coupon and deposited it in a savings account earning 8% effective annual interest, so as to accumulate the full amount of the premium by a moment after the final deposit. How much did Alicia deposit each year in the 8% account?

3. A \$1,000 bond with a coupon rate of 8% has quarterly coupons and is redeemable after an unspecified number of years at \$ 957. The bond is bought to yield 12 % convertible semiannually. If the present value of the redemption amount is \$ 355.40, find the purchase price using the Makeham formula. Then check your answer using another price formula.

4. A fifteen-year bond, which was purchased at a premium, has semiannual coupons. The amount for amortization of the premium in the second coupon is \$ 977.19 and the amount for amortization of premium in the fourth coupon is \$ 1,046.79. Find the amount of the premium.

5. A three-year \$1,000 6 % bond with semiannual coupons has redemption amount \$ 1,040. Make amortization tables for this bond if it is bought to yield a nominal rate of 5% convertible semiannually. Repeat for a nominal rate of 6% and then for a nominal rate of 7%, each convertible semiannually.

6. We are concerned with a three-year \$1,000 6% bond with semiannual coupons and a redemption amount \$1,040. Suppose that the bond was purchased on January 1, 2000. Make a chart showing the theoretical and practical dirty and clean values of the bond at the end of each quarter if the bond was purchased at a discount to yield a nominal rate of 7% convertible semiannually. Use the "30/360" basis for counting days.

7. On May 27, 1994 Jen Mago purchased a new \$18,000 fifteen-year 10% bond with annual coupons and a redemption payment of \$19,000. Jen sold the bond to Edna Wilder on December 31, 2000. The semi-practical clean price for the sale was \$ 18,375; this was based on her market price and the "30/360" method for counting days. Still working on a "30/360" basis, find her annual yield rate $\widetilde{j}$ and theoretical clean price $\mathcal{C}_T^{\widetilde{j}}$

8. On March 1, 1990 Juanita paid \$ 6,317 to acquire a portfolio of six \$1,000 par-value bonds. All the bonds had annual coupons. The portfolio consisted of three 12% bonds with redemption dates of March 1, 1992, 1994, and 1996 and three 10% bonds with redemption dates of March 1, 1993, 1995, and 1997. Find Juanita's yield rate.

9. An n-year \$ 1,000 par-value bond with 8% annual coupons has an annual effective yield of i, $1+i>0$. The book value of the bond at the end of the third year is \$ 990.92 and the book value of the bond at the end of the fifth year is \$995.10. Find the price of the bond.