

MTH 351
Exam 4
Fall 2022

Show all work in a neat and organized fashion. Clearly indicate your answers.
100 points possible.

0. (2 pts.) Two free points

1. (14 pts.) A 1000 par value two-year 10% bond with semiannual coupons is bought to yield 12% convertible semiannually. Create an amortization schedule for this transaction.

<i>Period</i>	<i>Coupon</i>	<i>Interest Earned</i>	<i>Amount for Accumulation of Discount</i>	<i>Book Value</i>
1				
2				
3				
4				

2. (14 pts.) A 20,000 par value 10-year bond with 6% annual coupons is bought at a premium to yield an annual effective rate of 4%.

Calculate the interest portion of the 8th coupon.

3. (14 pts.) Among a company's assets and accounting records, an actuary finds a 20-year bond that was purchased at a premium. From the records, the actuary has determined the following:

- (i) The bond pays semi-annual interest.
- (ii) The amount for amortization of the premium in the 4th coupon payment was 639.93.
- (iii) The amount for amortization of the premium in the 6th coupon payment was 673.64.

What is the value of the premium?

4. (14 pts.) A 20-year 1000 par value bond has 6% semiannual coupons. The bond is redeemable at par at maturity, and is callable at par at the end of the 15th, 16th, 17th, 18th, or 19th year.

(a) Find the price to yield 5% convertible semiannually.

(b) Find the price to yield 7% convertible semiannually.

5. (14 pts.) A 1000 par value bond with 8% semiannual coupons and a maturity date 20 years from now can be called on any coupon date after the 20th coupon, according to the following schedule.

If called on the 21st through 30th coupon date, the redemption value will be 1150.

If called on the 31st through 39th coupon date, or if held to maturity, the redemption value will be 1100.

Find the maximum price that can be paid to guarantee a yield of 7% per annum compounded semiannually.

6. (14 pts.) You are given the following term structure of spot interest rates:

Term (in Years)	Spot Interest Rate
1	6.00%
2	7.00%
3	7.75%
4	8.25%
5	8.50%

Find the following expected forward rates.

(a) 1-year deferred 3-year forward rate

(b) 3-year deferred 2-year forward rate

7. (14 pts.) The one-year forward rates, deferred t years, are estimated to be:

Year (t)	0	1	2	3	4
Forward Rate	6%	8%	10%	12%	14%

Calculate the spot rate for a zero-coupon bond maturing three years from now.