MTH 351
Exam 3
Fall 2022

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

0. (4 pts.) Two free points

1. (12 pts.) An annuity pays 100 at the end of each quarter in the first year, 200 at the end of each quarter in the second year, and continues to increase until it pays 800 at the end of each quarter during the 8th year. Calculate the present value of the annuity at an annual effective interest rate of 15%.

2. (12 pts.) Hagrid receives payments of X at the end of each year for n years. The present value of his annuity is 498.

McGonagall receives payments of $5X$ at the end of each year for $2n$ years. The present value of her annuity is 4342.

Both present values are calculated at the same annual effective interest rate.

Determine v^n.

3. (12 pts.) A loan of 30,000 is being repaid with payment of 500 at the end of each month for as long as necessary plus an additional payment at the time of the last regular payment. What is the amount of the additional payment using an interest rate of 6% compounded monthly.

4. (12 pts.) A loan is being repaid with quarterly installments of 2500 at the end of each quarter for 10 years at 12% convertible quarterly. Find the amount of principal in the 8th installment.

5. (12 pts.) For a loan with level annual payments, the principal repaid in the 20th payment is 10,000 while the principal repaid in the 21st payment is 10,800. Calculate the principal repaid in the 24th payment.

6. (12 pts.) A loan of X is repaid with level annual payments at the end of each year for 20 years.

You are given:

i) The interest paid in the first year is 7030; and

ii) The principal repaid in the 11th year is 3388.42.

Calculate X.

7. (12 pts.) A ten-year 1000 par value bond pays 10% coupons semiannually. The bond is priced at 1098.21 to yield an annual nominal rate of 9% convertible semiannually. Calculate the redemption value of the bond.

8. (12 pts.) You are given the following information about two bonds, Bond A and Bond B:

i) Each bond is a 20-year bond with semiannual coupons redeemable at its par value of 1000, and is bought to yield an annual nominal interest rate of i, convertible semiannually.

ii) Bond A has an annual coupon rate of $(i + 0.05)$, paid semiannually.

iii) Bond B has an annual coupon rate of $(i - 0.05)$, paid semiannually.

iv) The price of Bond A is 823.84 greater than the price of Bond B.

Calculate i.