MTH 351
Exam 2
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.) Calculate the present value of 500 paid at the end of each year for 30 years using an annual effective interest rate of 9%.

2. (14 pts.) An annuity pays 1 at the end of each year for n years. Using an annual effective interest rate of i, the accumulated value of the annuity at time $(n+1)$ is 21.953. It is also known that $(1+i)^n = 2.813$.

Calculate n.

3. (14 pts.) An annuity pays 10 at the beginning of each 2 year period for 30 years. Find the accumulated value of the annuity just after the final payment, at 8% compounded semiannually.

4. (14 pts.) A perpetuity pays 5000 at the end of each quarter. Calculate the present value using an annual effective interest rate of 9%.

5. (14 pts.) You are given a perpetual annuity immediate with annual payments increasing in geometric progression, with a common ratio of 1.06. The annual effective interest rate is 10%. The first payment is 1. Calculate the present value of this annuity.

6. (14 pts.) A woman worked for 35 years before retiring. At the end of the first year of employment she deposited 6000 into an account for her retirement. At the end of each subsequent year of employment, she deposited 4% more than the prior year. The woman made a total of 35 deposits.

She will withdraw 90,000 at the beginning of the first year of retirement and will make annual withdrawals at the beginning of each subsequent year for a total of 35 withdrawals. Each of these subsequent withdrawals will be 4% more than the prior year. The final withdrawal depletes the account.

The account earns a constant annual effective interest rate.

Calculate the account balance after the final deposit and before the first withdrawal.

7. (14 pts.) An annuity pays 50 at the end of one month. It pays 60 at the end of the second month. It pays 70 at the end of the third month. The payments continue to increase by 10 each month until the last payment is made at the end of the 24th month. Find the present value of the annuity at 12% compounded monthly.