Quiz on 5.3, 5.4. Extra Credit from last quiz.

1. Vocabulary:
   - annuity
   - Payment period
   - Term of an annuity
   - Present value of an Annuity
   - Ordinary annuity
   - “a angle n at r” notation \( a_{n/r} \) a.k.a. Annuity present value factor
   - Annuity Due
   - Present Value of Annuity Due
   - Amount of an annuity a.k.a. future value
   - “s angle n at r” notation \( s_{n/r} \) a.k.a. Annuity compound amount factor

2. Use \( s = \frac{a(1-r^n)}{1-r} \) to find the sum of the geometric series: \( 3 + 1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} \)

3. Annuity: An annuity is a sequence of payments made at fixed periods over a given interval of time. If payments are made at the end of each payment period it is called an ordinary annuity.

   Present value of the Annuity is the sum of the present values of each payment.

   \[
   A = R(1+r)^{-1} + R(1+r)^{-2} + R(1+r)^{-3} + \ldots + R(1+r)^{-n} = \frac{s = R \cdot \frac{1-(1+r)^{-n}}{r}}{r}
   \]

   Present Value of Annuity with payment \( R \) for \( n \) periods with periodic rate \( r \).

   \[
   A = R \cdot \frac{1-(1+r)^{-n}}{r} = Ra_{n/r}
   \]

   Example: Deposit $100 every month for a 3.5 years. Assume an interest rate of 6% compounded monthly

   \( R= \text{payment} = $100 \quad \text{payment period} = 1 \text{ month} \quad \text{term} = 3.5 \text{ year} \quad \text{number of periods} = 3.5 \times 12 = 42 \)

**TVM Solver Setup:**

- \( N=42 \)
- \( I=6 \)
- \( PV=0 \)
- \( PMT=-100 \)
- \( FV=0 \)
- \( P/Y=12 \)
- \( C/Y=12 \)
- \( PMT:END \)

**TVM Solver for finding the factor values:**

- \( N=42 \)
- \( I=6 \)
- \( PV=0 \)
- \( PMT=-1 \)
- \( FV=0 \)
- \( P/Y=12 \)
- \( C/Y=12 \)
- \( PMT:END \)
4. Annuity Due:
The premiums on an insurance policy are $50 per quarter payable at the beginning of each quarter. If the policy holder wishes to pay one year’s premiums in advance, how much should be paid, provided the interest rate is 4% compounded quarterly.

\[ A = R + Ra_{n-1|r} \]

TVM Solver Setup:
- N=4
- I=4
- PV=0
- PMT=-50
- FV=0
- P/Y=4
- C/Y=4
- PMT:BEGIN

5. Amount (i.e. Future Value) of an Annuity

\[ S = R + R(1 + r)^1 + R(1 + r)^2 + R(1 + r)^3 + \ldots + R(1 + r)^{n-1} = s = R \cdot \frac{(1+r)^n - 1}{r} = Ra_{n|r} \]

Find the amount of an annuity consisting of payments of $50 at the end of every three months for three years at the rate of 6% compounded quarterly. Find the balance in the account at the end of 3 years.

TVM Solver Setup:
- N=12
- I=6
- PV=0
- PMT=-50
- FV=0
- P/Y=4
- C/Y=4
- PMT:END

TVM Solver for finding the factor values:
- N=12
- I=6
- PV=0
- PMT=-1
- FV=0
- P/Y=4
- C/Y=4
- PMT:END

6. Amount of Annuity Due

At the beginning of each quarter $50 is deposited into a savings account that pays 6% compounded quarterly. Find the balance in the account at the end of three years. Use: \[ S = R(s_{n+1|r} - 1) \]

TVM Solver Setup:
- N=12
- I=6
- PV=0
- PMT=-50
- FV=0
- P/Y=4
- C/Y=4
- PMT:BEGIN