Worksheet 9/25/2024

• *Continuous compounding:*

$$A = Pe^{APR \cdot N}$$

where P = original principal and A = accumulated balance in N years.

• *Annuity:*

$$A = q\frac{(1+i)^N - 1}{i}$$

where q = payment per period, i = interest rate per period, A = accumulated balance in N periods.

1. You deposit $500 in an account with an APR of 3%. With continuous compounding, how much will you have at the end of 1000 days? At the end of 40 months? At the end of 5 years?

2. You put $300 per month in an investment plan that pays an APR of 3.5%. How much will you have paid in 18 years (in other words, what is your total deposit)? How much will you have in your account in 18 years?

3. Which of the following investment methods will give more money at the end of 5 years? Find the total return (in percentage) for each investment method.

Annuity: monthly deposit of $100 at APR = 6%

Lump sum: one-time deposit of $20,000 at APR = 5%

4. At age 25, you start saving for retirement. If your investment plan pays an APR of 4% and you want to have $1 million when you retire in 40 years, how much should you deposit monthly?