Chapter 10 Expectations

NOTE: Whenever you see the word “communicate”, it is implied that it means to communicate both verbally and in writing!

Section 1: Expectations for Interest

Be able to do the following:

1. Communicate to your instructor that you know the definitions of the following terms: interest, principal, to compound interest, compound amount, balance.

2. Communicate to your instructor that you know what a compound period is.

3. Memorize Table 2 on page 470.

4. Communicate to your instructor that you know the difference between the annual interest rate, \( r \), and the interest rate per [compounding] period, \( i \), and how they are related to each other.

5. Find the interest rate per [compound] period when given the annual interest rate and the number of compound periods in a year.

6. Find the annual interest rate when given the interest rate per [compound] period and the number of compound periods in a year.

7. Recognize problems that are strictly compound interest.

8. Memorize and be able to recall the diagram of a compound interest situation (this will be presented in class and the accompanying powerpoint slides). Use the diagram to help you solve problems that are mixture of compound interest, increasing annuities, and/or decreasing annuities in the next section.

9. Memorize and be able to use the formula: \( B_{\text{new}} = B_{\text{previous}} + i \cdot B_{\text{previous}} \) and \( B_{\text{new}} = (1 + i)B_{\text{previous}} \). These formulas can be used to find the new balance (based on the previous balance) for compound interest problem.

10. Calculate the amount of interest earned for a compound period. The interest earned is always the value found by: \( i \cdot B_{\text{previous}} \).

11. Recognize that \( F = (1 + i)^n \cdot P \) is used for appropriate compound interest problem.

A. Communicate to your instructor that you know what each variable in the formula represents.

B. Calculate the future value, or the principal, using the formula for the appropriate compound interest problem.
C. NOTE: The formula \( F = (1 + i)^n \cdot P \) will be given on the test (along with the formula used to find \( P \) when given \( F \)). You will need to be able to recognize that it is used for compound interest problems.

12. Use the TVM Solver in the calculator to solve most compound interest problems.

13. Memorize and be able to use the formula: \( B_{\text{new}} = B_{\text{previous}} + r \cdot P \). This formula is the formula to find the new balance of a simple interest account based on the previous balance.

14. Recognize that \( F = (1 + n \cdot r) \cdot P \) is used for simple interest problems

A. Communicate to your instructor that you know what each variable in the formula represents.

B. Recall that \( n \) in this formula represents a different concept than the \( n \) in all the other formulas in chapter 10.

C. Use the formula to calculate a specified variable when given values for all the other variables.

D. Note that you cannot use the TVM Solver to solve any simple interest problems.

15. Communicate to your instructor that you know that the effective interest rate is used for the two following purposes:

(1) to indicate the actual rate of interest for the use of the money for a single year when interest is reinvested into the account as it is earned.

(2) to compare two (or more) accounts that have two different interest rates and two different number of compound periods per year.

16. Recognize the formula \( r_{\text{eff}} = (1 + \frac{i}{m})^m - 1 \) is used to find the effective rate of a specified account. The formula \( r_{\text{eff}} = (1 + \frac{i}{m})^m - 1 \) will be given on the test so you will NOT have to memorize it.

17. Find the effective interest rate of any compound interest problem.

18. Distinguish between problems that are compound interest problems and simple interest problems.

19. Use the TVM Solver to help solve compound interest problems that require 2 or more steps.

Section 2: Expectations for Annuities

Be able to do the following:
1. Communicate to your instructor that you know what an increasing annuity is.
2. Recognize problems that are strictly an increasing annuity.
3. Memorize and be able to use the formula: \( B_{\text{new}} = B_{\text{previous}} + i \cdot B_{\text{previous}} + R \) and \( B_{\text{new}} = (1 + i)B_{\text{previous}} + R \). These formulas can be used to find the new balance, based on the previous balance, for increasing annuities.
4. Memorize and be able to recall the diagram of an increasing annuity situation (this will be presented in class and in the accompanying powerpoint slides). Note that the first payment of rent, \( R \), comes at the END of the first compound period. Know how to use it when you encounter problems that are mixture of compound interest, increasing annuities, and/or decreasing annuities in this section.
5. Recognize that \( F = \frac{(1+i)^n-1}{i} \cdot R \) may used for an increasing annuity situation.
   A. Communicate to your instructor that you know what each variable in the formula represents.
   B. Use the formula to calculate the future value, or the rent, for an appropriate increasing annuity situation.
   C. The formula \( F = \frac{(1+i)^n-1}{i} \cdot R \) will be given on the test (along with the formula used to find \( R \) when given \( F \)). You will need to be able to recognize that it is used for increasing annuity problems.
6. Use the TVM Solver in the calculator to solve appropriate increasing annuity problems.
7. Communicate to your instructor that you know what a decreasing annuity is.
8. Recognize when a problem is a strictly a decreasing annuity.
9. Communicate to your instructor that you know the difference between an increasing annuity and a decreasing annuity.
10. Memorize and be able to recall the diagram of an increasing annuity situation (this will be presented in class and the accompanying powerpoint slides). Note that the first payment of rent, \( R \), comes at the end of the first compound period. Know how to use it when you encounter problems that are mixture of compound interest, increasing annuities, and/or decreasing annuities in the next section.
11. Memorize and be able to use the formula: \( B_{\text{new}} = B_{\text{previous}} + i \cdot B_{\text{previous}} - R \) and \( B_{\text{new}} = (1 + i)B_{\text{previous}} - R \). These formulas can be used to find the new balance (based on the previous balance) for decreasing annuity problems.
12. Recognize that \( P = \frac{1-(1+i)^{-n}}{i} \), \( R \) is used for a decreasing annuity situation.

A. Communicate to your instructor that you know what each variable in the formula represents. Know how \( P \) is defined in this situation (page 483 of the textbook).

B. Calculate the present value, or the rent, using the formula for an appropriate decreasing annuity problem.

C. The formula \( P = \frac{1-(1+i)^{-n}}{i} \), \( R \) will be given on the test (along with the formula used to find \( R \) when given \( P \)).

13. Use the TVM Solver in the calculator to solve decreasing annuity problems.

14. Communicate to your instructor that you know the differences between a compound interest problem, an increasing annuity problem, and a decreasing annuity problem.

15. Recognize problems that are a combination of compound interest, increasing annuity, and/or decreasing annuity situations.

16. Use the TVM Solver to help solve problems that are a mixture of compound interest, increasing annuity, and/or decreasing annuity situations.

Section 3: Expectations for Amortization of Loans

Be able to do the following:

1. Communicate to your instructor that you know the following definitions; amortization, loan, mortgage.

2. Communicate to your instructor that you know that the Principal refers to the amount of the loan (at the beginning of the loan) or it refers to the current balance that you still owe the lender after you start making payments.

3. Recognize that a loan is a decreasing annuity situation, but instead of earning interest, you are paying interest to the lender.

4. Communicate to your instructor that you know that a mortgage is a loan to purchase real estate.

5. Communicate to your instructor that you know what a down payment is. Communicate to your instructor that you know that the price of an item that a buyer will take a loan out for can be thought as the following formula:

\[
(\text{Price of an item}) = (\text{Down payment amount}) + (\text{Loan amount}).
\]

Use this idea in loan problems that have a down payment involved.
6. Memorize that in a loan situation, $B_{\text{new}}$ represents the principal (the remaining amount of money you owe the lender) and that in the formulas:
\[ B_{\text{new}} = B_{\text{previous}} + i \cdot B_{\text{previous}} - R \] and \[ B_{\text{new}} = (1 + i)B_{\text{previous}} - R \], the interest you owe the lender for the compound period is found by: $i \cdot B_{\text{previous}}$.

7. Use \[ P = \frac{1-(1+i)^{-n}}{i} \cdot R \] to find the monthly payments for a loan.

8. Communicate to your instructor that you know that monthly payment is broken down into two parts, part of the monthly payment is for interest and the other part of the monthly payment is applied towards (i.e. reduces) the principal. You can think of it using the following formula:

\[(\text{Monthly payment}) = (\text{Amount for interest}) + (\text{Amount applied towards the principal})\]

Note that “Amount applied towards the principal” means amount that the principal is reduced.

9. Use the TVM Solver to find the following information concerning a loan:

A. The monthly payment.

B. A balance at the end of a specified compounding period.

C. Find the amount of the loan when given the monthly payment, interest rate, and length of the loan, and the number of compound periods in a year.

D. Find the length of the loan when given the amount of the loan, monthly payment, interest rate, and the number of compound periods in a year.

E. Find the annual interest rate when given the length of the loan, amount of the loan, monthly payment, interest rate, and the number of compound periods in a year.