SECTION 2.1 – SIMPLE INTEREST AND COMPOUND INTEREST

Definition (Principal, Interest, Simple Interest, Future Value)

Simple Interest Formula

Future Value Formula (Simple Interest)
Example 1
Find the total amount due on a loan of $800 at 9% simple interest at the end of 4 months.

Example 2
If you want to earn an annual rate of 10% on your investments, how much (to the nearest cent) should you pay for a note that will be worth $5000 in 9 months?

Example 3
Treasury bills are one of the instruments the U.S. Treasury Dept uses to finance the public debt. If you buy a 180-day treasury bill with a maturity value of $10,000 for $9,893.78, what annual simple interest rate will you earn?
Definition (Compound Interest, Periodic Rate, Compounding Periods)

Future Value Formula (Compound Interest)
Example 4
You want to invest $1000 at 8% interest for 5 years.

a.) How much money will you have if interest is compounded semiannually?

b.) How much money will you have if interest is compounded monthly?

c.) How much money will you have if interest is compounded daily?

Example 5
How much should you invest now at 10% interest compounded quarterly to have $8000 toward the purchase of a car in 5 years?

Example 6
If money placed in a certain account triples in 2 years when interest is compounded quarterly, then what is the annual interest rate?
Definition (Annual Percentage Yield, Effective Annual Rate)

Annual Percentage Yield Formula

Example 7
A $10,000 investment in a particular growth-oriented mutual fund over a recent 10 year period would have grown to $126,000. What annual nominal rate compounded monthly would produce the same growth? What is the annual percentage yield?
Example 8
Find the APY’s for each of the banks in the following table and compare the CDs.

<table>
<thead>
<tr>
<th>BANK</th>
<th>RATE</th>
<th>COMPOUNDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanta</td>
<td>4.95%</td>
<td>Monthly</td>
</tr>
<tr>
<td>DeepGreen</td>
<td>4.96%</td>
<td>Daily</td>
</tr>
<tr>
<td>Charter One</td>
<td>4.97%</td>
<td>quarterly</td>
</tr>
</tbody>
</table>
SECTION 2.2 – FUTURE VALUE OF AN ANNUITY

Definition (Annuity, Ordinary Annuity)

Future Value (Ordinary Annuity)

Example 1
What is the value of an annuity at the end of 20 years if $2000 is deposited each year into an account earning 8.5% interest compounded annually? How much of the value is interest?
Example 2
A person makes monthly deposits of $100 into an ordinary annuity. After 30 years, the annuity is worth $160,000. What annual rate compounded monthly has this annuity earned during this 30-year period?

Definition (Sinking Fund)

Note
Example 3
A company estimates that it will have to replace a piece of equipment at a cost of $800,000 in 5 years. To have this money available in 5 years, a sinking fund is established by making equal monthly payments into an account paying 6.6% compounded monthly. How much should each payment be? How much interest is earned during the last year?

Example 4
Jane deposits $2000 annually into a Roth IRA that earns 6.85% compounded annually. (The interest earned by a Roth IRA is tax free.) Due to a change in employment, these deposits stop after 10 years, but the account continues to earn interest until Jane retires 25 years after the last deposit was made. How much is in the account when Jane retires?
SECTION 2.3 – PRESENT VALUE OF AN ANNUITY

Present Value (Ordinary Annuity)

Example 1
What is the present value of an annuity that pays $200 per month for 5 years if money is worth 6% compounded monthly?

Example 2
Recently, Lincoln Benefit Life offered an ordinary annuity that earned 6.5% compounded annually. A person plans to make equal annual deposits into this account for 25 years in order to then make 20 equal annual withdrawals of $25,000, reducing the balance in the account to zero. How much must be deposited annually to accumulate sufficient funds to provide for these payments? How much total interest is earned during this entire 45-year process?
SECTION 2.4 – BORROWING

Definition (Simple Interest Loans, Add-On Loans)

Example 1
Suzie borrows $10,000 from her parents to buy a car. She agrees to pay them in equal monthly payments over the next 5 years with a simple interest rate of 5%. How much will Suzie pay each month?

Definition (Zero-Coupon Bonds, Discounted Loan)
Discounted Loan

Example 2
A loan is discounted over 30 months at an annual simple interest rate of 10%.
   a.) Find the proceeds if the amount of the loan is $1500.

   b.) Find the amount of the loan if the proceeds are $1500.

Definition (Conventional Loans, Amortizing)
Con conventional Loan

Example 3
Assume that you buy a television set for $800 and agree to pay for it in 18 equal monthly payments at 1.5% interest per month on the unpaid balance. How much are your payments? How much interest will you pay?
Example 4
You have negotiated a price of $25,200 for a new Bison pickup truck. Now you must choose between 0% financing for 48 months or a $3000 rebate. If you choose the rebate, you can obtain a loan for the balance at 4.5% interest compounded monthly for 48 months at your credit union. Which option should you choose?

Example 5
If you borrow $500 that you agree to repay in six equal monthly payments at 1% interest per month on the unpaid balance, how much of each monthly payment is used for interest and how much is used to reduce the unpaid balance?
**Example 6**

A couple plans to buy a home for $200,000. They have put $50,000 down and will obtain a mortgage for $150,000 at an interest rate of 10.5% compounded monthly. They must decide whether to apply for a 30-year or a 15-year mortgage. Find the monthly payment and total interest paid for both the 30-year mortgage and the 15-year mortgage.