Finance Review Solutions

1. Alice Cohen buys a two-year-old Honda from a car dealer for $9,000. She put $500 down and finances the rest through the dealer at 13% add-on interest. If she agrees to make 36 monthly payments, find the size of each payment.

Solution:

For this problem, we use the simple interest future value formula. We start by determining *P*. Since Alice has to put $500 down, she will only finance $8500. The interest rate in decimal form is .13. The amount of time in years is 3 years (36 months).

$$FV = 8500(1 + .13 * 3) = 11815$$

Once you have the total amount to be paid, you divide it by 36 to find out how much will be paid each month.

$$\textbf{monthly payment} = \frac{11815}{36} = 328.19$$

2. First National Bank offers two-year CDs at 9.12% compounded daily, and Citywide Savings offers two-year CDs at 9.13% compounded quarterly. Compute the annual yield for each institution and determine which is more advantageous for the consumer.

Solution:

9.12% CD:

For this problem, we use the annual yield formula $ay = \left(1 + \frac{r}{n}\right)^n - 1$.

The periodic interest rate is $\frac{.0912}{365}$.

$$ay = \left(1 + \frac{.0912}{365}\right)^{365} - 1$$

$$r = .0954756014$$

The annual yield is 9.548%.

9.13% CD:

For this problem, we use the annual yield formula for more than one year. The periodic interest rate is $\frac{.0913}{4}$.

$$ay = \left(1 + \frac{.0913}{4}\right)^{4} - 1$$

$$r = .0944737207$$

The annual yield is 9.447%.

The CD with the 9.12% compounded daily has a better annual yield.

3. Find the present value that will give a future value of \$9,280 at $9\frac{3}{4}\%$ compounded monthly for 2 years, 3 months.

Solution:

For this problem, we use the compound interest future value formula. We know that the future value is \$9280. The periodic interest rate is $\frac{.0975}{12}$. Here n is 12. The time is $t = 2 + \frac{3}{12} = 2.25$

$$9280 = P\left(1 + \frac{.0975}{12}\right)^{(12*2.25)}$$

$$P = 7458.64$$

The total amount that needs to be put in the account in order to have \$9280 after 2 years and 3 months is \$7458.64.

4. At age 25, Carrie establishes an Individual Retirement Account (IRA). If she invests \$4000 per year for 30 years in an ordinary annuity, the account earns 7.75% per year, how much will she have in the account at age 55?

Solution:

For this problem, we use the future value of an ordinary formula. The amount of each payment is \$4000. She is making the payments once per years. Here n is 1 (yearly investment) and t is 30.

$$FV = 4000\frac{\left(1 + \frac{.0775}{1}\right)^{1*30} - 1}{\frac{.0775}{1}}$$

$$FV = 432867.99$$

The total amount in the account at age 55 is \$432,867.99.

5. Joe wants to have $30,000 five years from now to use for a down payment on a house. How much should he deposit each month into an ordinary annuity that pays an annual rate of 7.7% in order to achieve his goal?

Solution:

For this problem, we use the future value of an ordinary annuity formula. We know that the future value needs to be $30,000. The periodic interest rate. n is 12 and t is 5.

$$30000 = pymt\frac{\left(1+\frac{.077}{12}\right)^{12*5}-1}{\frac{.077}{12}}$$

$$pymt = 411.49$$

The monthly payments are $411.49.

6. Shirley Trembley bought a house for $187,600. She put 20% down and obtained a simple interest amortized loan for the balance at $6\frac{3}{8}\%$ for 30 years.

a. Find the monthly payment.

b. Find the total interest.

Solution:

a. For this problem, we use the simple interest amortized loan formula. Since she put 20% down, the amount of the loan is $187600 * .80 = 150080$. The periodic interest rate is $\frac{.06375}{12}$. n is 12 and t is 30.

$$\text{pymt}\frac{\left(1+\frac{.06375}{12}\right)^{12*30}-1}{\frac{.06375}{12}} = 150080\left(1+\frac{.06375}{12}\right)^{12*30}$$

$$pymt = 936.30$$

The monthly payments are $936.30

b. To find the total interest, we first find the total amount of all the monthly payments over the whole 30 years.

$$\textbf{total payments} = 936.30 * 12 * 30 = 337068$$

Now we subtract the amount borrowed from the total of all the monthly payments to find the total interest.

$$\textbf{total interest} = 337068 - 150080 = 186988$$

Total interest is $186,988

c. To find the balance due (or unpaid balance) on the loan after 13 years, we need to use the balance due formula where T is 13

$$unpaid\ balance = 150080\left(1+\frac{.06375}{12}\right)^{12*13} - 936.30\frac{\left(1+\frac{.06375}{12}\right)^{12*13}-1}{\left(\frac{.06375}{12}\right)}$$

$$unpaid\ balance = 116446.97$$

d. Now we complete the amortization schedule.

Month	Principle Portion	Interest Portion	Total Monthly Payment	Balance Due on Loan
0				150080
1	139	797.30	936.30	149941
Skip Payments 2 through 155				
156				116446.97
157	317.68	618.62	936.30	116129.29

The balance due on the loan starts out (payment 0) as the amount borrowed. The balance due after 156 payments is the unpaid balance on the loan after $T = \frac{156}{12} = 13$ years (calculated in part c).

The interest portion is calculated using $I = Prt$ where P is the balance from the previous payment, r is the interest rate, and t is the amount of time covered in a single payment.

$$I = Prt = 150080(.06375)\left(\frac{1}{12}\right) = 797.30$$

The principal portion is the difference between the monthly payment and the interest portion.

$$936.30 - 797.30 = 139$$

Finally the new balance is the difference between the previous month's balance and the principle portion.

$$150080 - 139 = 149941$$

The 157th row is calculated is the same way.

Interest portion:

$$I = Prt = 11646.97(.06375)\left(\frac{1}{12}\right) = 618.62$$

Principle portion:

$$936.30 - 618.62 = 317.68$$

Balance due:

$$116446.97 - 317.68 = 116129.29$$