6.6 Methods of Savings

Figure 6.8 Money wisely invested grows over time. (credit: "Stack of Cash" by Janak Raja/Flickr, Public Domain Mark 1.0)

Learning Objectives

After completing this section, you should be able to:

1. Distinguish various basic forms of savings plans.
2. Compute return on investment for basic forms of savings plans.
3. Compute payment to reach a financial goal.

The stock market crash of 1929 led to the Great Depression, a decade-long global downturn in productivity and employment. A state of shock swept through the United States; the damage to people's lives was immeasurable. Americans no longer trusted established financial institutions. By October 1931, the banking industry's biggest challenge was restoring confidence to the American public. In the next 10 years, the federal government would impose strict regulations and guidelines on the financial industry. The Emergency Banking Act of 1933 created the Federal Deposit Insurance Corporation (FDIC), which insures bank deposits. The new federal guidelines helped ease suspicions among the general public about the banking industry. Gradually, things returned to normal, and today we have more investment instruments, many insured through the FDIC, than ever before.

In this section, we will first look at the different types of savings accounts and proceed to discuss the various types of investments. There is some overlap, but we will try to differentiate among these financial instruments. Saving money should be a goal of every adult, but it can also be a difficult goal to attain.

Distinguish Various Basic Forms of Savings Plans

There are at least three types of savings accounts. Traditional savings accounts, certificates of deposit (CDs), and money market accounts are three main savings account vehicles.

Savings Account

A savings account is probably the most well-known type of investment, and for many people it is their first experience with a bank. A **savings account** is a deposit account, held at a bank or other financial institution, which bears some interest on the deposited money. Savings accounts are intended as a place to save money for emergencies or to achieve short-term goals. They typically pay a low interest rate, but there is virtually no risk involved, and they are insured by the FDIC for up to $250,000.

Savings accounts have some strengths. They are highly flexible. Generally, there are no limitations on the number of withdrawals allowed and no limit on how much you can deposit. It is not unusual, however, that a savings account will have a minimum balance in order for the bank to pay maintenance costs. If your account should dip below the minimum, there are usually fees attached.

WHO KNEW?

Many banks are covered by FDIC insurance. The FDIC is the Federal Deposit Insurance Corporation and is an independent agency created by the U.S. Congress. One of its purposes is to provide insurance for deposits in banks, including savings accounts. Be aware, not all banks are FDIC insured. The FDIC insures up to $250,000 for a savings account, so you do not want your balance to exceed that federally insured limit.

Having your savings account at the same bank as your checking account does offer a real advantage. For example, if your checking account is approaching its lower limit, you can transfer funds from your savings account and avoid any bank fees. Similarly, if you have an excess of funds in your checking account, you can transfer funds to your savings account and earn some interest. Checking accounts rarely pay interest.

PEOPLE IN MATHEMATICS

J.P. Morgan

J.P. Morgan was a wealthy banker around the turn of the 20th century. His business interests included railroads and the steel industry. However, it was in 1907 that a financial crisis, caused by poor banking decisions and followed by such great distrust in the banking system that a frenzy of withdrawals from banks occurred, that J.P. Morgan and other wealthy bankers lent from their own funds to help stabilize and save the system.

There are some weaknesses to savings accounts. Primarily, it is because savings accounts earn very low interest rates. This means they are not the best way to grow your money. Experts, though, recommend keeping a savings account balance to cover 3 to 6 months of living expenses in case you should lose your job, have a sudden medical expense, or other emergency.

Around tax time, you will receive a 1099-INT form stating the amount of interest earned on your savings, which is the amount that must be reported when you file your tax return. A **1099 form** is a tax form that reports earnings that do not come from your employer, including interest earned on savings accounts. These 1099 forms have the suffix INT to indicate that the income is interest income.

Savings accounts earn interest, and those earnings can be found using the interest formulas from previous sections. The final value of these accounts is sometimes called the future value of the account.

EXAMPLE 6.55

Single Deposit in a Savings Account

Violet deposits $4,520.00 in a savings account bearing 1.45% interest compounded annually. If she does not add to or withdraw any of that money, how much will be in the account after 3 years?

Solution

To find the compound interest, use the formula from Compound Interest, $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A represents the amount in the account after t years, with initial deposit (or principal) of P, at an annual interest rate, in decimal form, of r, compounded n times per year. Violet has a principal of $4,520.00, which will earn an interest of $r = 0.0145$, compounded yearly (so $n = 1$), for $t = 3$ years. Substituting and calculating, we find that Violet's account will be worth

$$\begin{aligned} A &= P\left(1 + \frac{r}{n}\right)^{nt} \\ &= \$4{,}520.00\left(1 + \frac{0.0145}{1}\right)^{1\times 3} \\ &= \$4{,}520.00(1.0145)^3 \\ &= \$4{,}719.48 \end{aligned}$$

Or, Violet will have $4,719.48 after 3 years.

YOUR TURN 6.55

1. Brian deposits $5,600 in a savings account that yields 1.23% interest compounded annually. If he leaves that deposit in the account and adds nothing new to the account, what will the account be worth in 5 years?

WHO KNEW?

Banks have not always offered interest on savings accounts. An 1836 publication from Indiana noted that banks in other states allow small interest on deposits. It specifically says that in these other states, these deposits are what business transactions are based upon. And that giving interest would encourage deposits, and thus increase the business that banks can do.

Journal of the House of Representatives of the Sate of Indiana (https://openstax.org/r/onepage)

Certificates of Deposit, or CDs

We discussed **certificates of deposit** (CDs) in earlier sections. CDs differ from savings accounts in a few ways. First, the investment lasts for a fixed period of time, agreed to when the money is invested in the CD. These time periods often range from 6 months to 5 years. Money from the CD cannot be withdrawn (without penalty) until the investment period is up. Also, money cannot be added to an existing CD.

Certificates of deposit have features similar to savings accounts. They are insured by the FDIC. They are entirely safe. They do, though, offer a better interest rate. The trade-off is that once the money is invested in a CD, that money is unavailable until the investment period ends.

EXAMPLE 6.56

5-Year CD

Silvio deposits $10,000 in a CD that yields 2.17% compounded semiannually for 5 years. How much is the CD worth after 5 years?

Solution

This also uses the compound interest formula from Compound Interest, $A = P\left(1 + \frac{r}{n}\right)^{nt}$, Substituting the values P = $10,000, r = 0.0217, n = 2 (semiannually means twice per year), and t = 5, we find the account will be worth

$$\begin{aligned} A &= P\left(1 + \frac{r}{n}\right)^{nt} \\ &= \$10,000.00\left(1 + \frac{0.0217}{2}\right)^{2\times 5} \\ &= \$10{,}000.00(1.01085)^{10} \\ &= \$11,239.53 \end{aligned}$$

The CD will be worth $11,219.53 after 5 years.

YOUR TURN 6.56

1. Denise deposits $3,500 in a CD bearing 2.23% interest compounded quarterly for 3 years. How much will Denise's CD be worth after those 3 years?

Money Market Account

A **money market account** is similar to a savings account, except the number of transactions (withdrawals and transfers) is generally limited to six each month. Money market accounts typically have a minimum balance that must be maintained. If the balance in the account drops below the minimum, there is likely to be a penalty. Money market accounts offer the flexibility of checks and ATM cards. Finally, the interest rate on a money market account is typically higher than the interest rate on a savings account.

EXAMPLE 6.57

Single Deposit to a Money Market Account

Marietta opens a money market account, and deposits $2,500.00 in the account. It bears 1.76% interest compounded monthly. If she makes no other transactions on the account, how much will be in the account after 4 years?

Solution

This, once again, uses the compound interest formula from Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$, Substituting the values P = $25,000, r = 0.0176, n = 12, and t = 4, we find the account will be worth

$$\begin{aligned} A &= P\left(1 + \frac{r}{n}\right)^{nt} \\ &= \$2{,}500.00\left(1 + \frac{0.0176}{12}\right)^{12 \times 4} \\ &= \$2{,}500.00(1.0014\overline{6})^{48} \\ &= \$2{,}682.20 \end{aligned}$$

The money market account will be worth $2,682.20 after 4 years.

YOUR TURN 6.57

1. Chuck opens a money market account, and deposits $8,500.00 in the account. It bears 1.83% interest compounded quarterly. If he leaves makes no other transactions on the account, how much will be in the account after 3 years?

Return on Investment

If we want to compare the profitability of different investments, like savings accounts versus other investment tools, we need a measure that evens the playing field. Such a measure is **return on investment**.

FORMULA

The return on investment, often denoted ROI, is the percent difference between the initial investment, P, and the final value of the investment, FV, or $\text{ROI} = \frac{FV - P}{P}$, expressed as a percentage.

The length of time of the investment is not considered in ROI.

EXAMPLE 6.58

Calculating Return on Investment

1. Determine the return on investment for the 5-year CD from Example 6.56. Round the percentage to two decimal places.
2. Determine the return on investment for the money market account from Example 6.57. Round the percentage to two decimal places.

Solution

1. The initial deposit in the CD was $10,000, so P = $10,000. The value at the end of 5 years was $11,239.53. so FV = $11,239.53. Substituting and computing we find the return on investment.

$$\begin{aligned}\text{ROI} &= \frac{FV - P}{P} \\ &= \frac{\$11{,}239.53 - \$10{,}000}{\$10{,}000} \\ &= \frac{\$1{,}239.53}{\$10,000} \\ &= 0.123953\end{aligned}$$

The ROI is 12.40%.

2. The initial deposit in the money market was \$2,500, so P = \$2,500. The value at the end of 4 years was \$2,682.20. so FV = \$2,682.20. Substituting and computing we find the return on investment.

$$\begin{aligned}\text{ROI} &= \frac{FV - P}{P} \\ &= \frac{\$2{,}682.20 - \$2{,}500}{\$2{,}500} \\ &= \frac{\$182.20}{\$2{,}500} \\ &= 0.07288\end{aligned}$$

The ROI is 7.29%.

YOUR TURN 6.58

1. The amount of \$13,000 is invested in a savings account. After 10 years the account has \$15,250.00. Find the return on investment for this account.
2. The amount of \$6,500 is deposited in a money market account. After 7 years, the account has \$7,358.00. Find the return on investment for this account.

VIDEO

Return on Investment, ROI (https://openstax.org/r/This_video)

Annuities as Savings

In Compound Interest, we talked about the future value of a single deposit. In reality, people often open accounts that allow them to add deposits, or *payments*, to the account at regular intervals. This agrees with the 50-30-20 budget philosophy, where some income is saved every month. When a deposit is made at the end of each compounding period, such a savings account is called an **ordinary annuity**.

The formula for the future value of an ordinary annuity is $FV = pmt \times \frac{(1 + r/n)^{n \times t} - 1}{r/n}$, where FV is the future value of the annuity, pmt is the payment, r is the annual interest rate (in decimal form), n is the number of compounding periods per year, and t is the number of years.

It is important to note that the number of deposits per year and the number of periods per year are the same.

Another form of annuity if the annuity due, which has deposits at the start of each compounding period. This other annuity type has different formulas and is not addressed in this text.

EXAMPLE 6.59

Future Value of an Ordinary Annuity

Jill has an account that bears 3.75% interest compounded monthly. She decides to deposit \$250.00 each month, at the end of the compounding period, into this account. What is the future value of this account, after 8 years?

Solution

These are regular payments into an account bearing compound interest. She is depositing them at the end of each compounding period. This makes this an ordinary annuity. Substituting the values pmt = 250, r = 0.0375, n = 12, and t = 8 into the formula, we find the future value of the account.

$$\begin{aligned} FV &= pmt \times \frac{(1 + r/n)^{n \times t} - 1}{r/n} \\ &= 250 \times \frac{(1 + 0.0375/12)^{12 \times 8} - 1}{0.0375/12} \\ &= 250 \times \frac{(1.003125)^{96} - 1}{0.003125} \\ &= 250 \times \frac{1.34922752406 - 1}{0.003125} \\ &= 250 \times \frac{0.34922752406}{0.003125} \\ &= 250 \times 111.752807699 \\ &= 27,938.202 \end{aligned}$$

The account, after 8 years, will contain $27,938.20.

YOUR TURN 6.59

1. Kelly invests $525 every third month, at the end of the compounding period, into an account bearing 3.89% interest compounded quarterly. How much will be in the account after 15 years?

WHO KNEW?

Setting Savings Account Interest Rates

There are a number of factors that contribute to the amount a bank gives for savings accounts. The interest rate reflects how much the bank values deposits. It also reflects the money that the bank will earn when they lend out money. Finally, interest rates are impacted by the Federal Reserve Bank. When the Fed raises interest rates, so do banks.

PEOPLE IN MATHEMATICS

The Federal Reserve Chairperson

The Federal Reserve Board monitors the risks in the financial system to help ensure a healthy economy for individuals, companies, and communities. The Board oversees the 12 regional reserve banks. The Chairperson of the Federal Reserve Board testifies to Congress twice per year, meets with the secretary of the Treasury, chairs the Federal Open Market Committee, and is the face of federal monetary policy. Currently, the Fed Chair is Jerome Powell, who has served since 2018.

EXAMPLE 6.60

Saving for College

When Yusef was born, Rita and George began to save for Yusef’s college years by investing $2,500 each year in a savings account bearing 3.4% interest compounded annually. How much will they have saved after 18 years?

Solution

To find the future value of the account, we use the ordinary annuity formula $FV = pmt \times \frac{(1 + r/n)^{n \times t} - 1}{r/n}$. The payment is \$2,500, rate is 0.034, the number of compounding periods is 1, and the number of years is 18. Substituting these values and computing, we have

$$\begin{aligned} FV &= pmt \times \frac{(1 + r/n)^{n \times t} - 1}{r/n} \\ &= \$2{,}500 \times \frac{(1 + 0.034/1)^{1 \times 18} - 1}{0.034/1} \\ &= \$2{,}500 \times \frac{(1.034)^{18} - 1}{0.034} \\ &= \$2{,}500 \times \frac{1.82544897331 - 1}{0.034} \\ &= \$2{,}500 \times 24.2779109798 \\ &= \$60{,}694.77 \end{aligned}$$

After saving for 18 years, Rita and George will have \$60,694.77 for Yusef's college.

YOUR TURN 6.60

1. Bemnet saves \$280 per month in a savings account bearing 3.11% interest compounded monthly. After 20 years, how much does Bemnet have in the account?

TECH CHECK

Google Sheets offers a function to calculate the future value of an ordinary annuity. To get Google Sheets to calculate the future value, you use the following:

=fv(rate,number_of_periods, payment, present_value, end_or_beginning).

To explain, the rate is the rate per compounding period. From our formula, that is r/n. Also, the number of periods must be entered. From our formula, that is $n \times t$. The payment is the amount deposited each period. Present value is 0 if we begin with no money and rely only on the payments to be made. However, if some money is available to put in the account before the payments start, that amount, an initial deposit, would be the value of PV. Finally, for an ordinary annuity, enter 0 for end or beginning. Using the values for Jill, the payment amount is \$250, r = 0.0375, n = 12, t = 8, and that there is no initial deposit, PV = 0, the Google Sheets formula is

=fv(0.0375/12,12*8,250,0,0).

Figure 6.9 shows the formula in Google Sheets.

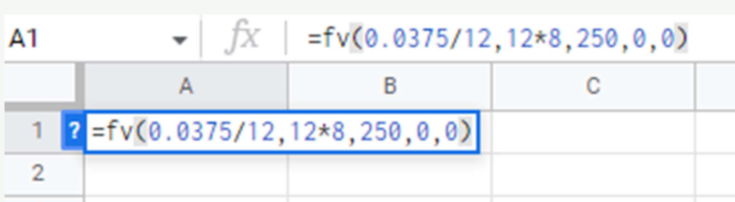

Figure 6.9 Google Sheets formula

Hitting the enter key shows the payment value (Figure 6.10).

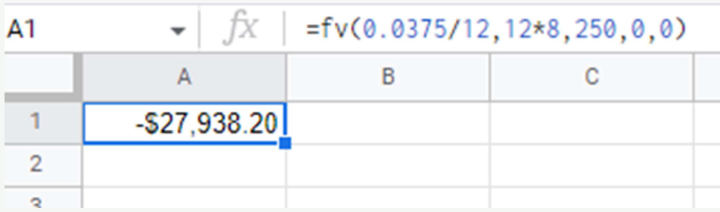

Figure 6.10 Payment value

Notice that the future value is negative, since it is a payment leaving an account.

VIDEO

Future Value Using Google Sheets (https://openstax.org/r/cell_references)

Compute Payment to Reach a Financial Goal

The formula used to get the future value of an ordinary annuity is useful, finding out what the final amount in the account will be. However, that isn't how planning works. To plan, we need to know how much to put into the ordinary annuity each compounding period in order to reach a goal. Fortunately, that formula exists.

FORMULA

The formula for the amount that needs to be deposited per period, pmt, of an ordinary annuity to reach a specified goal, FV, is $pmt = \frac{FV \times (r/n)}{(1 + r/n)^{n \times t} - 1}$, where r is the annual interest rate (in decimal form), n is the number of periods per year, and t is the number of years.

With this formula, it is possible to plan the amount to be saved.

EXAMPLE 6.61

Saving for a Car

Yaroslava wants to save in order to buy a car, in 3 years, without taking out a loan. She determines that she'll need $35,500 for the purchase. If she deposits money into an ordinary annuity that yields 4.25% interest compounded monthly, how much will she need to deposit each month?

Solution

Yaroslava has a goal and needs to know the payments to make to reach the goal. Her goal is FV = $35,500, with an interest rate r = 0.0425, compounded per month so n = 12, and for 3 years, making t = 3. Substituting into the formula, Yaroslava finds the necessary payment.

$$\begin{aligned} pmt &= \frac{FV \times (r/n)}{(1 + r/n)^{n \times t} - 1} \\ &= \frac{35{,}500 \times (0.0425/12)}{(1 + 0.0425/12)^{12 \times 3} - 1} \\ &= \frac{35{,}500 \times (0.003541\overline{6})}{(1.003541\overline{6})^{36} - 1} \\ &= \frac{125.7291\overline{6}}{0.13572901696} \\ &= 926.325 \end{aligned}$$

To reach her goal, Yaroslava would need to deposit $926.33 in her account each month.

This has been rounded up, so that the deposits don't fall short of the goal. However, some round off using the *standard rounding rules: if the last digit is 1, 2, 3, or 4, the number is rounded down; if the last digit is 5, 6, 7, 8, or 9 the number is rounded up.*

YOUR TURN 6.61

1. Chione decides to put new siding on her house. She finds that it will cost about $27,800. She decides to begin saving for the purchase so that she doesn't take on debt to side the house. How much would Chione need to deposit each quarter in an ordinary annuity that yields 5.16% compounded quarterly for 5 years?

TECH CHECK

Google Sheets offers a function to calculate the payment necessary to reach a goal using ordinary annuities. To get Google Sheets to calculate the payment, you use the following:

=pmt(rate,number_of_periods, present_value, future_value, end_or_beginning).

To explain, the rate is per compounding period. From our formula, that is r/n. Also, the number of periods must be entered. From our formula, that is $n \times t$. The present value is the amount of money that the account begins with. If we begin with no money and rely only on the payments to be made, then this number is 0. However, if some money is available to put in the account before the payments start, that amount, an initial deposit, would be the value of PV. Next, enter the future value, FV. Finally, for an ordinary annuity, enter 0 for end or beginning. Using the values for Yaroslava, r = 0.0425, n = 12, t = 3, and that there is no initial deposit, PV = 0, the Google Sheets formula is

=pmt(0.0425/12,12*3,0,35500,0).

Figure 6.11 shows the formula in Google Sheets.

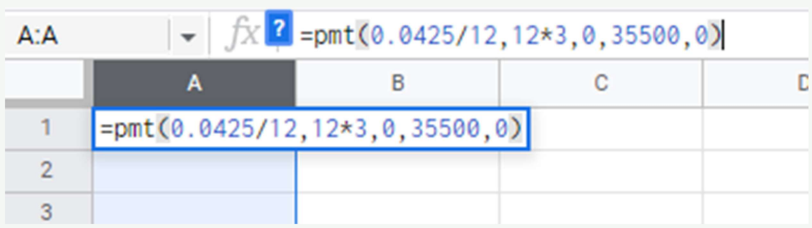

Figure 6.11 Google Sheets formula

Hitting the enter key shows the payment value (Figure 6.12).

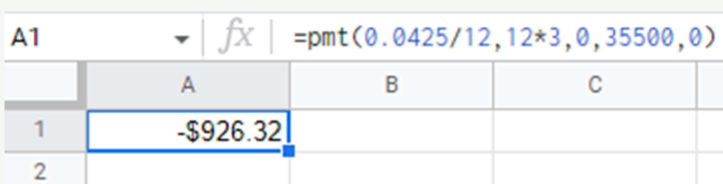

Figure 6.12 Payment value

Notice that the payment is negative, since it is a payment leaving an account. Additionally, the payment is $926.32. We rounded that up, but Google Sheets rounded off.

Check Your Understanding

32. What is a savings account?

33. How does a CD differ from a savings account?

34. Which is more flexible, a CD or a money market account? Why?

35. If $7,500 is deposited in a 4-year CD earning 3.28% interest compounded monthly, how much is in the account after 4 years?

36. If the initial deposit in an account is $10,000 and the account is worth $12,560 after 7 years, what is the return on investment?

37. Find the future value of an account if $450.00 per quarter is invested in a savings account bearing 3.5% interest compounded quarterly for 10 years.

38. How much must be deposited per quarter in an account bearing 2.98% interest compounded quarterly if the account is to be worth $300,000 after 25 years?

SECTION 6.6 EXERCISES

1. Which account has the greatest flexibility, savings, certificate of deposit, or money market?
2. Why are interest rates on savings accounts, CDs, and money market accounts low?
3. Which of savings accounts, certificates of deposit, and money market accounts, allow for transactions?
4. How does number of years impact the return on investment?

In the following exercises, find the future value of the account based on the information given.

5. The amount of $3,000 deposited in a CD bearing 2.6% compounded semi-annually for 3 years.
6. The amount of $1,500 deposited in a money market account bearing 3.11% interest compounded monthly for 10 years.
7. The amount of $8,450 deposited in a savings account bearing 1.75% interest compounded monthly for 2 years.
8. The amount of $10,500 deposited in a savings account bearing 1.35% interest compounded quarterly for 20 years.
9. The amount of $24,800 deposited in a money market account bearing 2.53% interest compounded semi-annually for 13 years.
10. The amount of $16,400 deposited in a CD bearing 2.55% interest compounded quarterly for 18 years.

In the following exercises, find the return on investment based on the specified exercise. Round to two decimal places.

11. Account from Exercise 5.
12. Account from Exercise 6.
13. Account from Exercise 7.
14. Account from Exercise 8.

In the following exercises, find the future value of the ordinary annuities based on the payment, interest rate, compounding periods and length of time given.

15. The amount of $150 deposited monthly in an account bearing 4.22% interest compounded monthly for 20 years.
16. The amount of $500 deposited semi-annually in an account bearing 3.62% interest compounded semi-annually for 30 years.
17. The amount of $250 deposited quarterly in an account bearing 3.61% interest compounded quarterly for 25 years.
18. The amount of $250 deposited monthly in an account bearing 3.09% interest compounded monthly for 40 years.
19. The amount of $1,500 deposited annually in an account bearing 3.34% interest compounded annually for 10 years.
20. The amount of $1400 deposited semi-annually in an account bearing 2.78% interest compounded semi-annually for 30 years.

In the following exercises, find the payment per period necessary to reach a specified future value based on the given interest rate, compounding periods per year, and number of years. Recall, the number of payments per year and the number of compounding periods per year are the same.

21. Future value of $1,000,000 from an account bearing 3.94% interest compounded monthly for 40 years.
22. Future value of $500,000 from an account bearing 2.11% interest compounded quarterly for 30 years.
23. Future value of $750,000 from an account bearing 3.27% interest compounded monthly for 25 years.
24. Future value of $300,000 from an account bearing 3.59% interest compounded semiannually for 35 years.
25. Future value of $1,000,000 from an account bearing 3.62% interest compounded annually for 25 years.
26. Future value of $600,000 from an account bearing 4.02% interest compounded quarterly for 30 years.

27. Dina deposits $3,000 in a 5-year CD that bears 3.25% interest compounded quarterly. What is the CD worth after those 5 years?

28. Timothy deposits $1,200 in a savings account that bears 1.85% interest compounded monthly. If Timothy does not deposit or withdraw money from the account how much is in Timothy's account after 3 years?

29. Leslie deposits $13,000 in a money market account that bears 2.55% interest compounded semi-annually. If Leslie does not withdraw or deposit money into the account, how much is in Leslie's account after 6 years?

30. Jennifer deposits $8,500 in a 3-year CD bearing 2.71% interest compounded annually. How much is Jennifer's CD worth after those 3 years?

31. Yasmin has analyzed her budget and decides to deposit $425 per month in an account bearing 3.99% interest compounded monthly. How much will be in the account after 20 years? After 30 years? After 40 years?

32. Brad applied the 50-30-20 budget philosophy to his income and decides that he can afford $380 per month for savings. He finds an account bearing 3.47% interest compounded monthly. How much will he have in the account after 25 years? 30 years? 35 years?

33. Ashliegh wants to save for an early retirement. She thinks she needs $1,250,000 to retire at the age of 55, which is 30 years from now. How much must she deposit per month in an account bearing 3.48% interest compounded monthly to reach her goal?

34. Colin plans out the next 38 years of his life. In order to retire in 38 years (age 65) with $1,450,000, how much should he deposit quarterly in an account bearing 4.21% interest compounded quarterly to reach his goal?

In the following exercises, different savings strategies will be compared.

35. Sam is 23 years old and has just landed her first post-college job. She creates a budget, and using the 50-30-20 budget philosophy, she sees she should save or pay down debt with $650. She decides to apply $300 per month to long-term savings. She finds an account bearing 3.75% interest compounded monthly. Sam begins investing $300 per month in that account on her 24th birthday. How much will be in the account at age 65 (41 years)?

36. Sam decides instead to delay investing in the account until her 35th birthday. How much will be in the account at age 65 (30 years)?

37. Sam decides to deposit the $300 per month until she turns 35 years old (11 years). She will then stop investing the $300 monthly, and just allow the money to earn interest until her 65th birthday (30 more years). How much will be in her account on her 65th birthday? Hint: First, compute the FV of the deposits. Then use that FV as the principal for a single deposit into an account bearing 3.75% interest compounded monthly.

38. Compare the results of the three investment strategies.

In the following exercises, different savings strategies will be compared.

39. Dahlia is 22 years old and has just landed a banking job. She creates a budget, and using the 50-30-20 budget philosophy, she sees she should save or pay down debt with $400. She decides to apply $250 per month to long-term savings. She finds an account bearing 6.2% interest compounded monthly. Dahlia begins investing $250 per month in that account on her 23rd birthday. How much will be in the account on her 68th birthday (45 years)?

40. Dahlia decides instead to delay investing in the account until her 34th birthday. How much will be in the account on her 68th birthday (34 years)?

41. Dahlia decides to deposit the $250 per month until her 34th birthday (11 years). She will then stop investing the $250 monthly, and just allow the money to earn interest until her 68th birthday (34 more years). How much will be in her account on her 65th birthday? Hint: First compute the FV of the deposits. Then use that FV as the principal for a single deposit into an account bearing 6.2% interest compounded monthly.

42. Compare the results of the three investment strategies.