2.2 Compound Interest

TRUE/FALSE

1. Doubling the frequency of compounding in a compound interest investment will not double the amount of the interest.

   ANS: T PTS: 1 MSC: wcfm04.05.02.68

2. The effective rate exceeds the nominal rate when the interest is compounded less than once a year resulting in a larger effective rate.

   ANS: F PTS: 1 MSC: wcfm04.05.02.73

MULTIPLE CHOICE

1. Calculate the future value of an investment of $3,000, after one year, if it is deposited in a savings account that is compounded quarterly at an annual rate of 12%.

   a. $3,960.00
   b. $3,576.95
   c. $3,376.53
   d. $3,380.00
   e. None of these

   ANS: C PTS: 1 MSC: wcfm04.05.02.01m

2. $10,000 is deposited in a money market account when interest is compounded every month at an annual rate of 11%. Find the total amount accumulated at the end of 6 years. Round your answer to the nearest cent.

   a. $19,289.84
   b. $72,600.00
   c. $17,290.08
   d. $19,090.59
   e. None of these

   ANS: A PTS: 1 MSC: wcfm04.05.02.08m

3. You invest $10,000 in Rapid Growth Funds, which appreciate by 4%/year, with yields reinvested quarterly. By how much will your investment have grown after 7 years? Round your answer to the nearest cent.

   a. $19,987.03
   b. $3,159.32
   c. $3,212.91
   d. $721.35
   e. None of these

   ANS: E PTS: 1 MSC: wcfm04.05.02.22m

4. How much would you have to invest when you are 22 years old at 7% compounded monthly to end up with a million dollars by age 52? Round your answer to the nearest thousand.

a. $213,000
b. $131,000
c. $215,000
d. $123,000
e. None of these

ANS: D PTS: 1 MSC: wcfm04.05.02.34m

5. Calculate, to the nearest 0.1%, what annual interest rate would be required if you invested $6,000 in Apple stock and ended up with $13,415 when you sold the stock after 12 years? Assume that interest was compounded quarterly.

a. 7.2%
b. 7.4%
c. 6.8%
d. 6.6%
e. None of these

ANS: C PTS: 1 MSC: wcfm04.05.02.55m

6. Inflation has been running 2%/year. A car now costs $37,000. How much would it have cost 6 years ago?

a. $32,854.94
b. $33,004.94
c. $32,850.00
d. $32,776.17
e. None of these

ANS: A PTS: 1 MSC: wcfm04.05.02.37m

7. Find the effective annual interest rate of 5% compounded quarterly.

a. 5.34%
b. 5.25%
c. 5.09%
d. 5.39%
e. None of these

ANS: C PTS: 1 MSC: wcfm04.05.02.15m

8. You are offered three investments. What is the best investment?

a. The second will earn 18.5% compounded quarterly.
b. The third will earn 18% compounded weekly.
c. The first promises to earn 19% compounded annually.

ANS: A PTS: 1 MSC: wcfm04.05.02.44m

9. Calculate the future value of an investment of $11,000 at 1.5%/year, compounded weekly, after 2 years. Assume 52 weeks per year.

a. $10,977.83
b. $11,206.80

c. $10,663.71
d. $11,334.95
e. None of these

ANS: D PTS: 1 MSC: wcfm04.05.02.04m

10. Calculate the future value of an investment of $7,000 at 0.2%/year, compounded monthly, after 2 years.

a. $7,028.05
b. $7,028.03
c. $7,699.29
d. $7,156.20
e. $6,670.93

ANS: A PTS: 1 MSC: wcfm04.05.02.07m

11. Calculate the present value of an investment that will be worth $4,000 after 3 years at 7%/year compounded annually.

a. $3,137.04
b. $3,265.19
c. $3,622.31
d. $2,593.95
e. $3,244.32

ANS: B PTS: 1 MSC: wcfm04.05.02.10m

12. Find the effective annual interest rate of 17% compounded monthly.

a. 17.72%
b. 18.50%
c. 18.11%
d. 18.39%
e. 18.53%

ANS: D PTS: 1 MSC: wcfm04.05.02.16m

13. Determine the amount of money, to the nearest dollar, you must invest now at 4%/year compounded annually, so that you will be a millionaire in 55 years. Round your answer to the nearest dollar.

a. $115,656
b. $124,420
c. $111,209
d. $110,255
e. $112,129

ANS: A PTS: 1 MSC: wcfm04.05.02.33m

14. Calculate, to the nearest cent, the future value of an investment of $11,000 at 4.5% per year, compounded quarterly (4 times / year), after 10 years.

a. $FV = \$17{,}082.66$
b. $FV = \$12{,}302.07$
c. $FV = \$63{,}980.01$

d. $FV = \$17{,}208.15$
e. $FV = \$11{,}729.76$

ANS: D PTS: 1 MSC: wcfm04.05.02.03m

15. Calculate, to the nearest cent, the future value of an investment of $28,000 at 10.75% per year, compounded monthly, after 15 years.

a. $FV = \$32{,}007.85$
b. $FV = \$129{,}513.21$
c. $FV = \$139{,}424.70$
d. $FV = \$909{,}244.17$
e. $FV = \$47{,}813.65$

ANS: C PTS: 1 MSC: wcfm04.05.02.06m

16. Calculate, to the nearest cent, the present value of an investment that will be worth $3,000 after 16 years, at 5% per year, compounded annually.

a. $PV = \$3{,}750.00$
b. $PV = \$1{,}374.33$
c. $PV = \$1{,}350.23$
d. $PV = \$2{,}853.71$
e. $PV = \$2{,}806.91$

ANS: B PTS: 1 MSC: wcfm04.05.02.09m

17. Calculate, to the nearest cent, the present value of an investment that will be worth $10,000 after 6 years, at 6.2% compounded quarterly.

a. $PV = \$6{,}970.32$
b. $PV = \$6{,}900.15$
c. $PV = \$9{,}695.53$
d. $PV = \$9{,}699.32$
e. $PV = \$6{,}913.24$

ANS: E PTS: 1 MSC: wcfm04.05.02.12m

18. Find the effective annual interest rate of 11% compounded monthly. Round your answer to the nearest 0.01%.

a. $r_{\text{eff}} = 11.57\%$
b. $r_{\text{eff}} = 132.00\%$
c. $r_{\text{eff}} = 1.12\%$
d. $r_{\text{eff}} = 11.62\%$
e. $r_{\text{eff}} = 11.47\%$

ANS: A PTS: 1 MSC: wcfm04.05.02.17m

19. Find the effective annual interest rate of 15% compounded daily. Assume 365 days per year. Round your answer to the nearest 0.01%.

a. $r_{\text{eff}} = 16.23\%$
b. $r_{\text{eff}} = 16.18\%$

c. $r_{eff} = 54.75\%$
d. $r_{eff} = 4.11\%$
e. $r_{eff} = 16.08\%$

ANS: B PTS: 1 MSC: wcfm04.05.02.18m

20. You deposit $500 in an account at the Lifelong Trust Savings and Loan that pays 4%/year compounded quarterly. By how much will your deposit have grown after 4 years? Round the answer to the nearest cent.

a. $836.29
b. $586.29
c. $86.29
d. $86.19
e. $83.19

ANS: C PTS: 1 MSC: wcfm04.05.02.21m

21. When I was considering what to do with my $10,500 Lottery winnings, my broker suggested I invest half of it in gold, whose value was growing by 14%/year, and the other half in certificates of deposit (CDs), which were yielding 6%/year compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 13 years? Round your answer to the nearest cent.

a. $23,973.79
b. $40,033.03
c. $42,795.83
d. $40,157.26
e. $43,493.19

ANS: D PTS: 1 MSC: wcfm04.05.02.27m

22. When I was considering what to do with the $3,500 proceeds from my sale of technology stock, my broker suggested I invest half of it in municipal bonds, whose value was growing by 11%/year, and the other half in certificates of deposit (CDs), which were yielding 8%/year compounded every 2 months. Assuming that these rates are sustained, how much will my investment be worth in 12 years? Round your answer to the nearest cent.

a. $4,541.57
b. $10,663.86
c. $6,122.29
d. $10,664.86
e. $10,663.96

ANS: B PTS: 1 MSC: wcfm04.05.02.28m

23. During a prolonged recession, property values on Long Island depreciated by 8% every six months. If my house cost $240,000 originally, how much was it worth 7 years later? Round your answer to the nearest cent.

a. $74,685.98
b. $74,691.28
c. $74,687.38
d. $74,686.28
e. $74,687.28

ANS: D PTS: 1 MSC: wcfm04.05.02.29m

24. My recent marketing idea, the *Miracle Algae Growing Kit*, has been remarkably successful, with monthly sales growing by 4% every 6 months over the past 4 years. Assuming that I sold 400 kits the first month, what is the present rate of sales? Round your answer to the nearest whole number.

    a. 433 kits per month
    b. 432 kits per month
    c. 470 kits per month
    d. 547 kits per month
    e. 469 kits per month

    ANS: D PTS: 1 MSC: wcfm04.05.02.36m

25. Inflation is running at 2.4% per year when you deposit $12,000 in an account earning 6.3% per year compounded quarterly. In constant dollars, how much money will you have 7 years from now? Round your answer to the nearest cent.
    [*Hint*: First calculate the value of your account in 7 year's time, and then find its present value based on the inflation rate.]

    a. $15,743.92
    b. $15,753.92
    c. $15,779.91
    d. $15,588.86
    e. $15,691.01

    ANS: A PTS: 1 MSC: wcfm04.05.02.41m

26. If Brazil has an annual inflation rate of 11% and an item will cost 150,000 *reals* in 4 years, what does the same item cost now? Round to the nearest *real*.

    a. 98,820 *reals*
    b. 98,815 *reals*
    c. 230,203 *reals*
    d. 98,810 *reals*
    e. 232,440 *reals*

    ANS: D PTS: 1 MSC: wcfm04.05.02.49m

27. The nominal rate exceeds the effective rate when the interest is compounded _____ once a year resulting in a larger effective rate.

    a. equally
    b. less or equally than
    c. more or equally than
    d. less than
    e. more than

    ANS: D PTS: 1 MSC: wcfm04.05.02.73m

28. Doubling the frequency of compounding in a compound interest investment _____ double the amount of the interest.

    a. will
    b. will not

ANS: B PTS: 1 MSC: wcfm04.05.02.68m

NUMERIC RESPONSE

1. Find the effective annual interest rate of 8% compounded monthly. Round your answer to the nearest 0.01%.

   r^{eff} = _____ %

   ANS: 8.30

   PTS: 1 MSC: wcfm04.05.02.16

2. Calculate, to the nearest cent, the future value of an investment of $18,000 at 5% per year, compounded annually, after 11 years.

   $FV = \$$_____

   ANS: 30,786.11

   PTS: 1 MSC: wcfm04.05.02.01

3. Calculate, to the nearest cent, the future value of an investment of $15,000 at 4.25% per year, compounded quarterly, after 5 years.

   $FV = \$$_____

   ANS: 18,530.71

   PTS: 1 MSC: wcfm04.05.02.02

4. Calculate, to the nearest cent, the future value of an investment of $26,000 at 7% per year, compounded monthly, after 18 years.

   $FV = \$$_____

   ANS: 91,326.02

   PTS: 1 MSC: wcfm04.05.02.06

5. Calculate, to the nearest cent, the present value of an investment that will be worth $3,000 after 8 years, at 11% per year, compounded annually.

   $PV = \$$_____

   ANS: 1,301.78

   PTS: 1 MSC: wcfm04.05.02.09

6. Calculate, to the nearest cent, the present value of an investment that will be worth $10,000 after 9 years, at 8% compounded monthly.

$PV = \$$_____

ANS: 4,879.17

PTS: 1 MSC: wcfm04.05.02.12

7. Find the effective annual interest rate of 9% compounded monthly. Round your answer to the nearest 0.01%.

$r_{eff} =$ _____ %

ANS: 9.38

PTS: 1 MSC: wcfm04.05.02.17

8. Find the effective annual interest rate of 11% compounded daily. Assume 365 days per year. Round your answer to the nearest 0.01%.

$r_{eff} =$ _____ %

ANS: 11.63

PTS: 1 MSC: wcfm04.05.02.18

9. When I was considering what to do with my $10,500 Lottery winnings, my broker suggested I invest half of it in gold, whose value was growing by 11%/year, and the other half in certificates of deposit (CDs), which were yielding 6%/year compounded every 6 months. Assuming that these rates are sustained, how much will my investment be worth in 11 years? Round your answer to the nearest cent.

$ _____

ANS: 26,606.27

PTS: 1 MSC: wcfm04.05.02.27

10. When I was considering what to do with the $4,500 proceeds from my sale of technology stock, my broker suggested I invest half of it in municipal bonds, whose value was growing by 8%/year, and the other half in certificates of deposit (CDs), which were yielding 9%/year compounded every 2 months. Assuming that these rates are sustained, how much will my investment be worth in 9 years? Round your answer to the nearest cent.

$ _____

ANS: 9,525.22

PTS: 1 MSC: wcfm04.05.02.28

11. You invest $5,000 in Rapid Growth Funds, which appreciate by 7% per year, with yields reinvested quarterly. By how much will your investment have grown after 6 years? Round your answer to the nearest cent.

$ _____

ANS: 2,582.21

PTS: 1 MSC: wcfm04.05.02.22

12. During a prolonged recession, property values on Long Island depreciated by 4% every six months. If my house cost $140,000 originally, how much was it worth 9 years later? Round your answer to the nearest cent.

$ _____

ANS: 97,318.95

PTS: 1 MSC: wcfm04.05.02.29

13. Determine the amount of money, to the nearest dollar, you must invest at 6.2% per year, compounded semiannually, so that you will be a millionaire in 24 years time. Round your answer to the nearest dollar.

$ _____

ANS: 230,985

PTS: 1 MSC: wcfm04.05.02.33

14. My recent marketing idea, the *Miracle Algae Growing Kit*, has been remarkably successful, with monthly sales growing by 4% every 6 months over the past 8 years. Assuming that I sold 400 kits the first month, what is the present rate of sales? Round your answer to the nearest whole number.

_____ kits per month

ANS: 549

PTS: 1 MSC: wcfm04.05.02.36

15. Inflation is running at 2.6% per year when you deposit $15,000 in an account earning 6.1% per year compounded quarterly. In constant dollars, how much money will you have 6 years from now? Round your answer to the nearest cent.
[*Hint*: First calculate the value of your account in 6 year's time, and then find its present value based on the inflation rate.]

$ _____

ANS: 18,490.94

PTS: 1 MSC: wcfm04.05.02.41

16. If Brazil has an annual inflation rate of 11% and an item will cost 145,000 *reals* in 3 years, what does that same item cost now? Round to the nearest *real*.

_____ *reals*

ANS: 106,023

PTS: 1 MSC: wcfm04.05.02.49

17. Calculate, to the nearest cent, the future value of an investment of $13,000 at 1.5%/year, compounded quarterly, after 4 years.

$ _____

ANS: 13,802.33

PTS: 1 MSC: wcfm04.05.02.03

18. Calculate, to the nearest cent, the future value of an investment of $6,000 at 5.5%/year, compounded weekly, after 6 years. Assume 52 weeks per year.

$ _____

ANS: 8,344.35

PTS: 1 MSC: wcfm04.05.02.04

19. Calculate, to the nearest cent, the future value of an investment of $15,000 at 0.4%/year, compounded monthly, after 5 years.

$ _____

ANS: 15,302.97

PTS: 1 MSC: wcfm04.05.02.07

20. Calculate the present value of an investment that will be worth $3,000 after 4 years at 3%/year compounded annually. Round your answer to the nearest cent.

$P =$ _____

ANS: 2,665.46

PTS: 1 MSC: wcfm04.05.02.10

21. You deposit $500 in an account at the Lifelong Trust Savings and Loan that pays 4%/year compounded quarterly. By how much will your deposit have grown after 4 years? Round the answer to the nearest cent.

$_____

ANS: 86.29

PTS: 1 MSC: wcfm04.05.02.21

22. Determine the amount of money, to the nearest dollar, you must invest now at 5%/year compounded annually, so that you will be a millionaire in 50 years. Round your answer to the nearest cent.

$_____

ANS: 87,203.73

PTS: 1 MSC: wcfm04.05.02.34

23. Calculate, to the nearest cent, the future value of an investment of $13,000 at 0.4% per month, compounded monthly, after 9 years.

$FV =$ $ _____

ANS: 20,007.11

PTS: 1 MSC: wcfm04.05.02.08

24. Inflation has been running 2%/year. A car now costs $32,000. How much would it have cost 9 years ago? Round your answer to the nearest cent.

The car will have cost _____ 9 years ago.

ANS: 26,776.17

PTS: 1 MSC: wcfm04.05.02.37

25. Calculate, to the nearest 0.1%, what annual interest rate would be required if you invested $4,000 in Apple stock and ended up with $11,027 when you sold the stock after 9 years? Assume that interest was compounded quarterly.

The required annual interest rate is _____%.

ANS: 11.4

PTS: 1 MSC: wcfm04.05.02.55

SHORT ANSWER

1. Find the effective annual interest rate of 5%/year compounded annually, semiannually, quarterly, and monthly. Round the answers to 0.01%.

nominal rate compound annually	r_{eff} = _____ %/year
nominal rate compound semiannually	r_{eff} = _____ %/year
nominal rate compound quarterly	r_{eff} = _____ %/year
nominal rate compound monthly	r_{eff} = _____ %/year

ANS:
5.00; 5.06; 5.09; 5.12

PTS: 1 MSC: wcfm04.05.02.15

2. You are offered three investments. The first promises to earn 19% compounded annually, the second will earn 18.5% compounded quarterly, and the third will earn 18% compounded weekly. What is the best investment?

The best investment is the _____ investment.

ANS:

second

PTS: 1 MSC: wcfm04.05.02.44