Exercise 2 Time Value of Money

82. Your father's employer was just acquired, and he was given a severance payment of $397,500, which he invested at a 7.5% annual rate. He now plans to retire, and he wants to withdraw $35,000 at the end of each year, starting at the end of this year. How many years will it take to exhaust his funds, i.e., run the account down to zero?
    a. 27.19
    b. 24.55
    c. 26.13
    d. 21.38
    e. 26.40

    ANS: E

83. Your uncle has $280,000 invested at 7.5%, and he now wants to retire. He wants to withdraw $35,000 at the end of each year, starting at the end of this year. He also wants to have $25,000 left to give you when he ceases to withdraw funds from the account. For how many years can he make the $35,000 withdrawals and still have $25,000 left in the end?
    a. 10.31
    b. 13.39
    c. 15.67
    d. 15.80
    e. 14.19

    ANS: B

84. Your Aunt Ruth has $450,000 invested at 6.5%, and she plans to retire. She wants to withdraw $40,000 at the beginning of each year, starting immediately. How many years will it take to exhaust her funds, i.e., run the account down to zero?
    a. 13.82
    b. 15.11
    c. 23.03
    d. 15.29
    e. 18.43

    ANS: E

85. Your aunt has $760,000 invested at 5.5%, and she now wants to retire. She wants to withdraw $45,000 at the beginning of each year, beginning immediately. She also wants to have $50,000 left to give you when she ceases to withdraw funds from the account. For how many years can she make the $45,000 withdrawals and still have $50,000 left in the end?
    a. 41.13
    b. 39.50
    c. 40.72
    d. 39.10
    e. 45.61

    ANS: C

86. Suppose you just won the state lottery, and you have a choice between receiving $2,075,000 today or a 20-year annuity of $250,000, with the first payment coming one year from today. What rate of return is built into the annuity? Disregard taxes.
    a. 11.10%
    b. 10.38%
    c. 12.14%
    d. 9.44%
    e. 11.83%

    ANS: B

87. Your girlfriend just won the Florida lottery. She has the choice of $16,600,000 today or a 20-year annuity of $1,050,000, with the first payment coming one year from today. What rate of return is built into the annuity?
    a. 2.75%
    b. 2.73%
    c. 2.52%
    d. 2.35%
    e. 2.54%

    ANS: D

88. Assume that you own an annuity that will pay you $15,000 per year for 12 years, with the first payment being made today. You need money today to start a new business, and your uncle offers to give you $80,000 for the annuity. If you sell it, what rate of return would your uncle earn on his investment?
    a. 23.15%
    b. 16.17%
    c. 20.96%
    d. 19.96%
    e. 22.16%

    ANS: D

89. What annual payment must you receive in order to earn a 6.5% rate of return on a perpetuity that has a cost of $2,500?
    a. $138.13
    b. $191.75
    c. $144.63
    d. $199.88
    e. $162.50

    ANS: E

90. What is the present value of the following cash flow stream at a rate of 16.00%?

Years:	0	1	2	3	4
CFs:	$0	$75	$225	$0	$300

a. $397.55
b. $441.29
c. $322.02
d. $401.53
e. $469.11

ANS: A

91. What is the present value of the following cash flow stream at a rate of 18.5%?

Years:	0	1	2	3	4
CFs:	$0	$1,500	$3,000	$4,500	$6,000

a. $10,247.31
b. $8,051.45
c. $7,228.01
d. $9,149.38
e. $8,325.94

ANS: D

92. What is the present value of the following cash flow stream at a rate of 10.0%?

Years:	0	1	2	3
CFs:	$750	$2,450	$3,175	$4,400

a. $8,907.02
b. $7,660.04
c. $10,866.57
d. $8,639.81
e. $7,303.76

ANS: A

93. You sold a car and accepted a note with the following cash flow stream as your payment. What was the effective price you received for the car assuming an interest rate of 18.5%?

	0	1	2	3	4
CFs:	$0	$1,000	$2,000	$2,000	$2,000

a. $3,363.26
b. $5,515.75
c. $4,484.35
d. $4,394.66
e. $4,708.57

ANS: C

94. At a rate of 5.0%, what is the future value of the following cash flow stream?

Years:	0	1	2	3	4
CFs:	$0	$75	$225	$0	$300

a. $552.35
b. $558.70
c. $514.26
d. $704.72
e. $634.88

ANS: E

95. Your father paid $10,000 (CF at t = 0) for an investment that promises to pay $750 at the end of each of the next 5 years, then an additional lump sum payment of $13,500 at the end of the 5th year. What is the expected rate of return on this investment?
a. 12.91%
b. 10.46%
c. 11.49%
d. 15.23%
e. 12.39%

ANS: A

96. You are offered a chance to buy an asset for $5,250 that is expected to produce cash flows of $750 at the end of Year 1, $1,000 at the end of Year 2, $850 at the end of Year 3, and $6,250 at the end of Year 4. What rate of return would you earn if you bought this asset?
a. 18.10%
b. 19.96%
c. 15.73%
d. 16.91%
e. 14.55%

ANS: D

97. What's the future value of $3,300 after 5 years if the appropriate interest rate is 6%, compounded semiannually?
a. $5,100.16
b. $4,434.92
c. $4,390.57
d. $5,543.66
e. $5,233.21

ANS: B

98. What's the present value of $13,000 discounted back 5 years if the appropriate interest rate is 4.5%, compounded semiannually?
a. $9,886.30
b. $10,198.50
c. $10,406.63

d. $10,718.83
e. $11,655.43

ANS: C

99. What's the future value of $1,225 after 5 years if the appropriate interest rate is 6%, compounded monthly?
a. $1,900.19
b. $1,652.34
c. $1,751.48
d. $1,371.44
e. $1,272.30

ANS: B

100. What's the present value of $1,675 discounted back 5 years if the appropriate interest rate is 6%, compounded monthly?
a. $1,440.49
b. $1,241.80
c. $1,179.71
d. $1,266.63
e. $1,279.05

ANS: B

101. Master Card and other credit card issuers must by law print the Annual Percentage Rate (APR) on their monthly statements. If the APR is stated to be 23.50%, with interest paid monthly, what is the card's EFF%?
a. 30.66%
b. 26.20%
c. 23.32%
d. 22.80%
e. 22.54%

ANS: B

102. Riverside Bank offers to lend you $50,000 at a nominal rate of 6.5%, compounded monthly. The loan (principal plus interest) must be repaid at the end of the year. Midwest Bank also offers to lend you the $50,000, but it will charge an annual rate of 6.3%, with no interest due until the end of the year. How much higher or lower is the effective annual rate charged by Midwest versus the rate charged by Riverside?
a. –0.38%
b. –0.43%
c. –0.40%
d. –0.49%
e. –0.30%

ANS: C

103. Suppose Community Bank offers to lend you $10,000 for one year at a nominal annual rate of 9.00%, but you must make interest payments at the end of each quarter and then pay off the $10,000 principal amount at the end of the year. What is the effective annual rate on the loan?
a. 11.45%
b. 7.26%
c. 9.40%
d. 9.31%
e. 10.70%

ANS: D

104. Suppose a bank offers to lend you $10,000 for 1 year on a loan contract that calls for you to make interest payments of $320.00 at the end of each quarter and then pay off the principal amount at the end of the year. What is the effective annual rate on the loan?
a. 13.43%
b. 15.71%
c. 12.35%
d. 12.62%
e. 13.83%

ANS: A

105. Charter Bank pays a 3.30% nominal rate on deposits, with monthly compounding. What effective annual rate (EFF%) does the bank pay?
a. 4.05%
b. 3.52%
c. 3.55%
d. 3.35%
e. 4.09%

ANS: D

106. Suppose your credit card issuer states that it charges a 8.50% nominal annual rate, but you must make monthly payments, which amounts to monthly compounding. What is the effective annual rate?
a. 8.84%
b. 7.69%
c. 7.87%
d. 11.05%
e. 9.81%

ANS: A

107. Pace Co. borrowed $12,000 at a rate of 7.25%, simple interest, with interest paid at the end of each month. The bank uses a 360-day year. How much interest would Pace have to pay in a 30-day month?
a. $89.18
b. $55.1
c. $72.50
d. $89.9
e. $75.4

ANS: C

108. Suppose you deposited $47,000 in a bank account that pays 5.25% with daily compounding based on a 360-day year. How much would be in the account after 8 months, assuming each month has 30 days?
a. $37,478.98
b. $40,886.16
c. $48,674.00
d. $55,488.36
e. $60,355.76

ANS: C

109. Suppose you borrowed $13,000 at a rate of 9.0% and must repay it in 4 equal installments at the end of each of the next 4 years. How large would your payments be?
a. $3,651.55
b. $4,012.69
c. $3,972.57
d. $4,373.83
e. $4,092.95

ANS: B

110. Suppose you are buying your first condo for $220,000, and you will make a $15,000 down payment. You have arranged to finance the remainder with a 30-year, monthly payment, amortized mortgage at a 6.5% nominal interest rate, with the first payment due in one month. What will your monthly payments be?
a. $1,023.63
b. $1,580.80
c. $1,373.48
d. $1,049.55
e. $1,295.74

ANS: E

111. Your uncle will sell you his bicycle shop for $240,000, with "seller financing," at a 6.0% nominal annual rate. The terms of the loan would require you to make 12 equal end-of-month payments per year for 4 years, and then make an additional final (balloon) payment of $50,000 at the end of the last month. What would your equal monthly payments be?
a. $3,722.60
b. $4,712.16
c. $4,476.55
d. $3,675.48
e. $4,146.70

ANS: B

112. Suppose you borrowed $15,000 at a rate of 10.0% and must repay it in 5 equal installments at the end of each of the next 5 years. How much interest would you have to pay in the first year?
a. $1,680.00

b. $1,410.00
c. $1,500.00
d. $1,380.00
e. $1,710.00

ANS: C

113. You plan to borrow $45,000 at a 7.5% annual interest rate. The terms require you to amortize the loan with 7 equal end-of-year payments. How much interest would you be paying in Year 2?
a. $2,931.11
b. $3,110.56
c. $3,080.65
d. $2,990.92
e. $2,273.10

ANS: D

114. Your bank offers to lend you $180,000 at an 8.5% annual interest rate to start your new business. The terms require you to amortize the loan with 10 equal end-of-year payments. How much interest would you be paying in Year 2?
a. $14,269
b. $14,839
c. $14,982
d. $15,838
e. $10,987

ANS: A

115. You are considering an investment in a Third World bank account that pays a nominal annual rate of 18%, compounded monthly. If you invest $5,000 at the beginning of each month, how many months would it take for your account to grow to $360,000? Round fractional months up.
a. 55
b. 49
c. 38
d. 55
e. 59

ANS: B

116. You are considering investing in a bank account that pays a nominal annual rate of 7%, compounded monthly. If you invest $3,000 at the end of each month, how many months will it take for your account to grow to $395,000?
a. 89.16
b. 111.70
c. 110.72
d. 97.98
e. 81.32

ANS: D

117. Your child's orthodontist offers you two alternative payment plans. The first plan requires a $4,000 immediate up-front payment. The second plan requires you to make monthly payments of $137.41, payable at the end of each month for 3 years. What nominal annual interest rate is built into the monthly payment plan?
a. 17.81%
b. 12.06%
c. 14.36%
d. 17.52%
e. 15.08%

ANS: C

118. Your subscription to *Investing Wisely Weekly* is about to expire. You plan to subscribe to the magazine for the rest of your life, and you can renew it by paying $85 annually, beginning immediately, or you can get a lifetime subscription for $930, also payable immediately. Assuming that you can earn 6.0% on your funds and that the annual renewal rate will remain constant, how many years must you live to make the lifetime subscription the better buy?
a. 20.72
b. 13.59
c. 16.57
d. 17.07
e. 16.91

ANS: C

119. You just deposited $9,500 in a bank account that pays a 4.0% nominal interest rate, compounded quarterly. If you also add another $5,000 to the account one year (4 quarters) from now and another $7,500 to the account two years (8 quarters) from now, how much will be in the account three years (12 quarters) from now?
a. $19,617.39
b. $19,378.16
c. $23,923.65
d. $18,421.21
e. $28,469.15

ANS: C

120. Farmers Bank offers to lend you $50,000 at a nominal rate of 5.0%, simple interest, with interest paid quarterly. Merchants Bank offers to lend you the $50,000, but it will charge 5.0%, simple interest, with interest paid at the end of the year. What's the difference in the effective annual rates charged by the two banks?
a. –0.11%
b. –0.07%
c. –0.10%
d. –0.08%
e. –0.09%

ANS: E

121. Suppose you borrowed $75,000 at a rate of 8.5% and must repay it in 5 equal installments at the end of each of the next 5 years. By how much would you reduce the amount you owe in the first year?

a. $12,657.43
b. $15,695.21
c. $12,404.28
d. $13,037.15
e. $15,062.34

ANS: A

122. Suppose you borrowed $20,000 at a rate of 8.5% and must repay it in 5 equal installments at the end of each of the next 5 years. How much would you still owe at the end of the first year, after you have made the first payment?
a. $14,795.97
b. $13,133.50
c. $13,964.74
d. $16,624.68
e. $13,798.49

ANS: D

123. Your sister turned 35 today, and she is planning to save $20,000 per year for retirement, with the first deposit to be made one year from today. She will invest in a mutual fund that's expected to provide a return of 7.5% per year. She plans to retire 30 years from today, when she turns 65, and she expects to live for 25 years after retirement, to age 90. Under these assumptions, how much can she spend each year after she retires? Her first withdrawal will be made at the end of her first retirement year.
a. $200,362.24
b. $155,837.30
c. $183,665.39
d. $185,520.60
e. $157,692.51

ANS: D

124. You agree to make 24 deposits of $500 at the beginning of each month into a bank account. At the end of the 24th month, you will have $13,200 in your account. If the bank compounds interest monthly, what nominal annual interest rate will you be earning?
a. 10.14%
b. 10.77%
c. 7.79%
d. 11.14%
e. 9.05%

ANS: E

125. Your company has just taken out a 1-year installment loan for $72,500 at a nominal rate of 18.5% but with equal end-of-month payments. What percentage of the 2nd monthly payment will go toward the repayment of principal?
a. 84.51%
b. 80.29%
c. 66.76%
d. 91.27%

e. 82.82%

ANS: A

126. On January 1, 2009, your brother's business obtained a 30-year amortized mortgage loan for $425,000 at a nominal annual rate of 7.0%, with 360 end-of-month payments. The firm can deduct the interest paid for tax purposes. What will the interest tax deduction be for 2009?
a. $33,759.09
b. $34,055.22
c. $29,613.24
d. $29,317.10
e. $31,390.03

ANS: C

127. Steve and Ed are cousins who were both born on the same day, and both turned 25 today. Their grandfather began putting $3,800 per year into a trust fund for Steve on his 20th birthday, and he just made a 6th payment into the fund. The grandfather (or his estate's trustee) will make 40 more $3,800 payments until a 46th and final payment is made on Steve's 65th birthday. The grandfather set things up this way because he wants Steve to work, not be a ""trust fund baby,"" but he also wants to ensure that Steve is provided for in his old age.

Until now, the grandfather has been disappointed with Ed, hence has not given him anything. However, they recently reconciled, and the grandfather decided to make an equivalent provision for Ed. He will make the first payment to a trust for Ed today, and he has instructed his trustee to make 40 additional equal annual payments until Ed turns 65, when the 41st and final payment will be made. If both trusts earn an annual return of 8%, how much must the grandfather put into Ed's trust today and each subsequent year to enable him to have the same retirement nest egg as Steve after the last payment is made on their 65th birthday?
a. $6,909
b. $5,889
c. $5,153
d. $5,663
e. $5,833

ANS: D

128. After graduation, you plan to work for Dynamo Corporation for 12 years and then start your own business. You expect to save and deposit $7,500 a year for the first 6 years (t = 1 through t = 6) and $15,000 annually for the following 6 years (t = 7 through t = 12). The first deposit will be made a year from today. In addition, your grandfather just gave you a $25,000 graduation gift which you will deposit immediately (t = 0). If the account earns 9% compounded annually, how much will you have when you start your business 12 years from now?
a. $330,578
b. $294,465
c. $277,797
d. $261,129
e. $255,573

ANS: C

129. You are negotiating to make a 7-year loan of $27,500 to Breck Inc. To repay you, Breck will pay $2,500 at the end of Year 1, $5,000 at the end of Year 2, and $7,500 at the end of Year 3, plus a fixed but currently unspecified cash flow, X, at the end of each year from Year 4 through Year 7. Breck is essentially riskless, so you are confident the payments will be made. You regard 8% as an appropriate rate of return on a low risk but illiquid 7-year loan. What cash flow must the investment provide at the end of each of the final 4 years, that is, what is X?

a. $5,683.99
b. $5,172.43
c. $5,513.47
d. $5,740.83
e. $5,058.75

ANS: A

130. "John and Daphne are saving for their daughter Ellen's college education. Ellen just turned 10 at (t = 0), and she will be entering college 8 years from now (at t = 8). College tuition and expenses at State U. are currently $14,500 a year, but they are expected to increase at a rate of 3.5% a year. Ellen should graduate in 4 years--if she takes longer or wants to go to graduate school, she will be on her own. Tuition and other costs will be due at the beginning of each school year (at t = 8, 9, 10, and 11).

So far, John and Daphne have accumulated $13,000 in their college savings account (at t = 0). Their long-run financial plan is to add an additional $5,000 in each of the next 4 years (at t = 1, 2, 3, and 4). Then they plan to make 3 equal annual contributions in each of the following years, t = 5, 6, and 7. They expect their investment account to earn 9%. How large must the annual payments at t = 5, 6, and 7 be to cover Ellen's anticipated college costs?"

a. $3,069.41
b. $3,598.62
c. $3,528.06
d. $4,374.80
e. $4,092.55

ANS: C