Chapter 02
How to Calculate Present Values

Multiple Choice Questions

1. The present value of $100 expected in two years from today at a discount rate of 6% is:
A. $116.64
B. $108.00
C. $100.00
D. $89.00

2. Present Value is defined as:
A. Future cash flows discounted to the present at an appropriate discount rate
B. Inverse of future cash flows
C. Present cash flow compounded into the future
D. None of the above

3. If the interest rate is 12%, what is the 2-year discount factor?
A. 0.7972
B. 0.8929
C. 1.2544
D. None of the above

4. If the present value of the cash flow X is $240, and the present value cash flow Y $160, then the present value of the combined cash flow is:
A. $240
B. $160
C. $80
D. $400

5. The rate of return is also called: I) discount rate; II) hurdle rate; III) opportunity cost of capital
A. I only
B. I and II only
C. I, II, and III
D. None of the given ones

6. Present value of $121,000 expected to be received one year from today at an interest rate (discount rate) of 10% per year is:
A. $121,000
B. $100,000
C. $110,000
D. None of the above

7. One year discount factor at a discount rate of 25% per year is:
A. 1.25
B. 1.0
C. 0.8
D. None of the above

8. The one-year discount factor at an interest rate of 100% per year is:
A. 1.5
B. 0.5
C. 0.25
D. None of the above

9. Present Value of $100,000 that is, expected, to be received at the end of one year at a discount rate of 25% per year is:
A. $80,000
B. $125,000
C. $100,000
D. None of the above

10. If the one-year discount factor is 0.8333, what is the discount rate (interest rate) per year?
A. 10%
B. 20%
C. 30%
D. None of the above

11. If the present value of $480 to be paid at the end of one year is $400, what is the one-year discount factor?
A. 0.8333
B. 1.20
C. 0.20
D. None of the above

12. If the present value of $250 expected to be received one year from today is $200, what is the discount rate?
A. 10%
B. 20%
C. 25%
D. None of the above

13. If the one-year discount factor is 0.90, what is the present value of $120 to be received one year from today?
A. $100
B. $96
C. $108
D. None of the above

14. If the present value of $600 expected to be received one year from today is $400, what is the one-year discount rate?
A. 15%
B. 20%
C. 25%
D. 50%

15. The present value formula for one period cash flow is:
A. $PV = C_1(1 + r)$
B. $PV = C_1/(1 + r)$
C. $PV = C_1/r$
D. None of the above

16. The net present value formula for one period is:
I) $NPV = C_0 + [C_1/(1 + r)]$; II) $NPV = PV$ required investment; and III) $NPV = C_0/C_1$
A. I only
B. I and II only
C. III only
D. None of the above

17. An initial investment of $400,000 will produce an end of year cash flow of $480,000.
What is the NPV of the project at a discount rate of 20%?
A. $176,000
B. $80,000
C. $0 (zero)
D. None of the above

18. If the present value of a cash flow generated by an initial investment of $200,000 is
$250,000,
what is the NPV of the project?
A. $250,000
B. $50,000
C. $200,000
D. None of the above

19. What is the present value of the following cash flow at a discount rate of 9%?

Year 1	Year 2	Year 3
$100,000	$150,000	$200,000

A. $372,431.81
B. $450,000
C. $405,950.68
D. None of the above

20. At an interest rate of 10%, which of the following cash flows should you prefer?

	Year 1	Year 2	Year 3
A)	500	300	100
B)	100	300	500
C)	300	300	300
D)	Any of the above as they all add up to $900		

A. Option A
B. Option B
C. Option C
D. Option D

21. What is the net present value of the following cash flow at a discount rate of 11%?

t=0	t=1	t=2
-120,000	300,000	-100,000

A. $69,108.03
B. $231,432.51
C. $80,000
D. None of the above

22. What is the present value of the following cash flow at a discount rate of 16% APR?

t=1	t=2
-100,000	300,000

A. $136,741.97
B. $122,948.87
C. $158,620.69
D. None of the above

23. What is the net present value (NPV) of the following cash flows at a discount rate of 9%?

t = 0	t = 1	t=2	t=3
-250,000	100,000	150,000	200,000

A. $122,431.81
B. $200,000
C. $155,950.68
D. None of the above

24. The following statements regarding the NPV rule and the rate of return rule are true except:
A. Accept a project if its NPV > 0
B. Reject a project if the NPV < 0
C. Accept a project if its rate of return > 0
D. Accept a project if its rate of return > opportunity cost of capital

25. An initial investment of $500 produces a cash flow $550 one year from today. Calculate the rate of return on the project
A. 10%
B. 15%
C. 25%
D. none of the above

26. According to the net present value rule, an investment in a project should be made if the:
A. Net present value is greater than the cost of investment
B. Net present value is greater than the present value of cash flows
C. Net present value is positive
D. Net present value is negative

27. Which of the following statements regarding the net present value rule and the rate of return rule is not true?
A. Accept a project if NPV > cost of investment
B. Accept a project if NPV is positive
C. Accept a project if return on investment exceeds the rate of return on an equivalent investment in the financial market
D. Reject a project if NPV is negative

28. The opportunity cost of capital for a risky project is
A. The expected rate of return on a government security having the same maturity as the project
B. The expected rate of return on a well-diversified portfolio of common stocks
C. The expected rate of return on a portfolio of securities of similar risks as the project
D. None of the above

29. A perpetuity is defined as:
A. Equal cash flows at equal intervals of time for a specific number of periods
B. Equal cash flows at equal intervals of time forever
C. Unequal cash flows at equal intervals of time forever
D. None of the above

30. Which of the following is generally considered an example of a perpetuity:
A. Interest payments on a 10-year bond
B. Interest payments on a 30-year bond
C. Consols
D. None of the above

31. You would like to have enough money saved to receive $100,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments start one year from the date of your retirement. The interest rate is 12.5%)?
A. $1,000,000
B. $10,000,000
C. $800,000
D. None of the above

32. What is the present value of $10,000 per year perpetuity at an interest rate of 10%?
A. $10,000
B. $100,000
C. $200,000
D. None of the above

33. You would like to have enough money saved to receive $80,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments start one year from the date of your retirement. The interest rate is 8%)?
A. $7,500,000
B. $750,000
C. $1,000,000
D. None of the above

34. You would like to have enough money saved to receive a $50,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments starts on the day of retirement. The interest rate is 8%)?
A. $1,000,000
B. $675,000
C. $625,000
D. None of the above

35. You would like to have enough money saved to receive an $80,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments starts on the day of retirement. The interest rate is 10%)?
A. $1,500,000
B. $880,000
C. $800,000
D. None of the above

36. An annuity is defined as
A. Equal cash flows at equal intervals of time for a specified period of time
B. Equal cash flows at equal intervals of time forever
C. Unequal cash flows at equal intervals of time forever
D. None of the above

37. If you receive $1,000 payment at the end each year for the next five years, what type of cash flow do you have?
A. Uneven cash flow stream
B. An annuity
C. An annuity due
D. None of the above

38. If the three-year present value annuity factor is 2.673 and two-year present value annuity factor is 1.833, what is the present value of $1 received at the end of the 3 years?
A. $1.1905
B. $0.84
C. $0.89
D. None of the above

39. If the five-year present value annuity factor is 3.60478 and four-year present value annuity factor is 3.03735, what is the present value at the $1 received at the end of five years?
A. $0.63552
B. $1.76233
C. $0.56743
D. None of the above

40. What is the present value annuity factor at a discount rate of 11% for 8 years?
A. 5.7122
B. 11.8594
C. 5.1461
D. None of the above

41. What is the present value annuity factor at an interest rate of 9% for 6 years?
A. 7.5233
B. 4.4859
C. 1.6771
D. None of the above

42. What is the present value of $1000 per year annuity for five years at an interest rate of 12%?
A. $6,352.85
B. $3,604.78
C. $567.43
D. None of the above

43. What is the present value of $5000 per year annuity at a discount rate of 10% for 6 years?
A. $21,776.30
B. $3,371.91
C. $16,760.78
D. None of the above

44. After retirement, you expect to live for 25 years. You would like to have $75,000 income each year. How much should you have saved in the retirement to receive this income, if the interest is 9% per year (assume that the payments start on the day of retirement)?
A. $736,693.47
B. $802,995.88
C. $2,043,750
D. None of the above

45. After retirement, you expect to live for 25 years. You would like to have $75,000 income each year. How much should you have saved in the retirement to receive this income, if the interest is 9% per year (assume that the payments start one year after the retirement)?
A. $736,693.47
B. $6,352,567.22
C. $1,875,000
D. None of the above

46. For $10,000 you can purchase a 5-year annuity that will pay $2504.57 per year for five years. The payments are made at the end of each year. Calculate the effective annual interest rate implied by this arrangement: (approximately)
A. 8%
B. 9%
C. 10%
D. None of the above

47. If the present value annuity factor for 10 years at 10% interest rate is 6.1446, what is the present value annuity factor for an equivalent annuity due?
A. 6.1446
B. 7.38
C. 6.759
D. None of the above

48. If the present annuity factor is 3.8896, what is the present value annuity factor for an equivalent annuity due if the interest rate is 9%?
A. 3.5684
B. 4.2397
C. 3.8896
D. None of the above.

49. For $10,000 you can purchase a 5-year annuity that will pay $2358.65 per year for five years. The payments are made at the beginning of each year. Calculate the effective annual interest rate implied by this arrangement: (approximately)
A. 8%
B. 9%
C. 10%
D. none of the above

50. John House has taken a $250,000 mortgage on his house at an interest rate of 6% per year. If the mortgage calls for twenty equal annual payments, what is the amount of each payment?
A. $21,796.14
B. $10,500.00
C. $16,882.43
D. None of the above

51. John House has taken a 20-year, $250,000 mortgage on his house at an interest rate of 6% per year. What is the value of the mortgage after the payment of the fifth annual installment?
A. $128,958.41
B. $211,689.53
C. $141,019.50
D. None of the above

52. If the present value of $1.00 received n years from today at an interest rate of r is 0.3855, then what is the future value of $1.00 invested today at an interest rate of r% for n years?
A. $1.3855
B. $2.594
C. $1.70
D. Not enough information to solve the problem

53. If the present value of $1.00 received n years from today at an interest rate of r is 0.621, then what is the future value of $1.00 invested today at an interest rate of r% for n years?
A. $1.00
B. $1.61
C. $1.621
D. Not enough information to solve the problem

54. If the future value of $1 invested today at an interest rate of r% for n years is 9.6463, what is the present value of $1 to be received in n years at r% interest rate?
A. $9.6463
B. $1.00
C. $0.1037
D. None of the above

55. If the future value annuity factor at 10% and 5 years is 6.1051, calculate the equivalent present value annuity factor
A. 6.1051
B. 3.7908
C. 6.7156
D. None of the given ones

56. If the present value annuity factor at 10% APR for 10 years is 6.1446, what is the equivalent future value annuity factor?
A. 3.108
B. 15.9374
C. 2.5937
D. None of the above

57. If the present value annuity factor at 12% APR for 5 years is 3.6048, what is the equivalent future value annuity factor?
A. 2.0455
B. 6.3529
C. 1.7623
D. None of the above

58. If the present value annuity factor at 8% APR for 10 years is 6.71, what is the equivalent future value annuity factor?
A. 3.108
B. 14.487
C. 2.159
D. None of the above

59. You are considering investing in a retirement fund that requires you to deposit $5,000 per year, and you want to know how much the fund will be worth when you retire. What financial technique should you use to calculate this value?
A. Future value of a single payment
B. Future value of an annuity
C. Present value of an annuity
D. None of the above

60. Mr. Hopper is expected to retire in 25 years and he wishes accumulate $750,000 in his retirement fund by that time. If the interest rate is 10% per year, how much should Mr. Hopper put into the retirement fund each year in order to achieve this goal? [Assume that the payments are made at the end of each year]
A. $4,559.44
B. $2,500
C. $7,626.05
D. None of the above

61. Mr. Hopper is expected to retire in 30 years and he wishes accumulate $1,000,000 in his retirement fund by that time. If the interest rate is 12% per year, how much should Mr. Hopper put into the retirement fund each year in order to achieve this goal?
A. $4,143.66
B. $8,287.32
C. $4,000
D. None of the above

62. You would like to have enough money saved to receive a growing annuity for 20 years, growing at a rate of 5% per year, the first payment being $50,000 after retirement. That way, you hope that you and your family can lead a good life after retirement. How much would you need to save in your retirement fund to achieve this goal.(assume that the growing annuity payments start one year from the date of your retirement. The interest rate is 10%)?
A. $1,000,000
B. $425,678.19
C. $605,604.20
D. None of the above

63. You would like to have enough money saved to receive a growing annuity for 25 years, growing
at a rate of 4% per year, the first payment being $60,000 after retirement, so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal? (assume that the growing perpetuity payments start one year from the date of
your retirement. The interest rate is 12%)?
A. $1,500,000
B. $632,390
C. $452,165
D. None of the above

64. The discount rate is used for calculating the NPV is:
A. Determined by the financial markets
B. Found by the government
C. Found by the CEO
D. None of the above

65. The managers of a firm can maximize stockholder wealth by:
A. Taking all projects with positive NPVs
B. Taking all projects with NPVs greater than the cost of investment
C. Taking all projects with NPVs greater than present value of cash flow
D. All of the above

66. If you invest $100 at 12% APR for three years, how much would you have at the end of 3 years using simple interest?
A. $136
B. $140.49
C. $240.18
D. None of the above

67. If you invest $100 at 12% APR for three years, how much would you have at the end of 3 years using compound interest?
A. $136
B. $140.49
C. $240.18
D. None of the above

68. Which of the following statements is true?
A. The process of discounting is the inverse of the process of compounding.
B. Ending balances using simple interest is always greater than the ending balance using compound interest at positive interest rates.
C. Present value of an annuity due is always less than the present value of an equivalent annuity at positive interest rates.
D. All of the above are true.

69. The concept of compound interest is most appropriately described as:
A. Interest earned on an investment
B. The total amount of interest earned over the life of an investment
C. Interest earned on interest
D. None of the above

70. Ms. Colonial has just taken out a $150,000 mortgage at an interest rate of 6% per year. If the mortgage calls for equal monthly payments for twenty years, what is the amount of each payment? (Assume monthly compounding or discounting.)
A. $1254.70
B. $1625.00
C. $1263.06
D. None of the above are true

71. An investment at 10.47% effective rate compounded monthly is equal to a nominal (annual) rate of:
A. 10.99%
B. 9.57%
C. 10%
D. None of the above

72. An investment at 12% nominal rate compounded monthly is equal to an annual rate of:
A. 12.68%
B. 12.36%
C. 12%
D. None of the above

73. Mr. William expects to retire in 30 years and would like to accumulate $1 million in the pension fund. If the annual interest rate is 12% per year, how much should Mr. Williams put into the pension fund each month in order to achieve his goal? Assume that Mr. Williams will deposit the same amount each month into his pension fund and also use monthly compounding.
A. $286.13
B. $771.60
C. $345.30
D. None of the above

74. An investment at 10% nominal rate compounded continuously is equal to an equivalent annual rate of:
A. 10.250%
B. 10.517%
C. 10.381%
D. None of the above

75. The present value of a $100 per year perpetuity at 10% per year interest rate is $1000. What would be the present value if the payments were compounded continuously?
A. $1000.00
B. $1049.21
C. $1024.40
D. None of the above

True / False Questions

76. The rate of return, discount rate, hurdle rate or opportunity cost of capital all means the same.
True   False

77. A dollar today is worth more than a dollar tomorrow if the interest rate is positive.
True   False

78. The present value of a future cash flow can be found by dividing it by an appropriate discount factor.
True   False

79. Net present value is found by subtracting the required investment from the present value of future cash flows.
True   False

80. The opportunity cost of capital is higher for safe investments than for risky ones.
True   False

81. A safe dollar is always worth less than a risky dollar because the rate of return on a safe investment is generally low and the rate of return on a risky investment is generally high.
True   False

82. "Accept investments that have positive net present values" is called the net present value rule.
True   False

83. "Accept investments that offer rates of return in excess of opportunity cost of capital".
True   False

84. The rate of return on any perpetuity is equal to the cash flow multiplied by the price.
True   False

85. An annuity is an asset that pays a fixed sum each year for a specified number of years.
True   False

86. The value of a five-year annuity is equal to the sum of two perpetuities. One makes its first
payment in year 1, and the other makes its first payment in year 6.
True   False

87. An equal-payment home mortgage is an example of an annuity.
True   False

88. In the amortization of a mortgage loan with equal payments, the fraction of each payment devoted to interest steadily increases over time and the fraction devoted to reducing the loan decreases steadily.
True   False

89. In the case of a growing perpetuity, the present value of the cash flow is given by:
$[C_1/(r - g)]$ where $r > g$.
True   False

90. Compound interest assumes that you are reinvesting the interest payments at the rate of return.
True   False

Short Answer Questions

91. Briefly explain the term "discount rate."

92. Intuitively explain the concept of the present value.

93. State the "net present value rule."

94. Briefly explain the concept of risk.

95. State the "rate of return rule."

96. Discuss why a dollar tomorrow cannot be worth less than a dollar the day after tomorrow.

97. Define the term "perpetuity."

98. Describe how you would go about finding the present value of any annuity given the formula for
the present value of a perpetuity.

99. What is the difference between simple interest and compound interest?

100. Briefly explain, "continuous compounding."

Chapter 02 How to Calculate Present Values Answer Key

Multiple Choice Questions

1. The present value of $100 expected in two years from today at a discount rate of 6% is:
A. $116.64
B. $108.00
C. $100.00
D. $89.00

PV = 100/(1.06^2) = 89.00

Type: Easy

2. Present Value is defined as:
A. Future cash flows discounted to the present at an appropriate discount rate
B. Inverse of future cash flows
C. Present cash flow compounded into the future
D. None of the above

Type: Easy

3. If the interest rate is 12%, what is the 2-year discount factor?
A. 0.7972
B. 0.8929
C. 1.2544
D. None of the above

DF2 = 1/(1.12^2) = 0.7972

Type: Easy

4. If the present value of the cash flow X is $240, and the present value cash flow Y $160, then the present value of the combined cash flow is:
A. $240
B. $160
C. $80
D. $400

PV (x + y) = PV (x) + PV (y) = 240 + 160 = 400

Type: Easy

5. The rate of return is also called: I) discount rate; II) hurdle rate; III) opportunity cost of capital
A. I only
B. I and II only
C. I, II, and III
D. None of the given ones

Type: Easy

6. Present value of $121,000 expected to be received one year from today at an interest rate (discount rate) of 10% per year is:
A. $121,000
B. $100,000
C. $110,000
D. None of the above

PV = (121,000)/(1.1) = 110,000

Type: Easy

7. One year discount factor at a discount rate of 25% per year is:
A. 1.25
B. 1.0
C. 0.8
D. None of the above

Discount Factor = 1/1.25 = 0.8

Type: Easy

8. The one-year discount factor at an interest rate of 100% per year is:
A. 1.5
B. 0.5
C. 0.25
D. None of the above

Discount factor = 1/(1 + 1) = 0.5

Type: Easy

9. Present Value of $100,000 that is, expected, to be received at the end of one year at a discount rate of 25% per year is:
A. $80,000
B. $125,000
C. $100,000
D. None of the above

PV = (100,000)/(1 + 0.25) = 80,000

Type: Easy

10. If the one-year discount factor is 0.8333, what is the discount rate (interest rate) per year?
A. 10%
B. 20%
C. 30%
D. None of the above

$1 + r = 1/(0.8333) = 1.20; r = 20\%$

Type: Medium

11. If the present value of $480 to be paid at the end of one year is $400, what is the one-year discount factor?
A. 0.8333
B. 1.20
C. 0.20
D. None of the above

Discount factor is $= 400/480 = 0.8333$

Type: Medium

12. If the present value of $250 expected to be received one year from today is $200, what is the discount rate?
A. 10%
B. 20%
C. 25%
D. None of the above

$1 + r = 250 /200 = 1.25; r = 25\%$

Type: Medium

13. If the one-year discount factor is 0.90, what is the present value of $120 to be received one year from today?
A. $100
B. $96
C. $108
D. None of the above

PV = (120)(0.90) = 108

Type: Medium

14. If the present value of $600 expected to be received one year from today is $400, what is the one-year discount rate?
A. 15%
B. 20%
C. 25%
D. 50%

1 + r = (600)/(400) = 1.5; r = 50%

Type: Medium

15. The present value formula for one period cash flow is:
A. PV = $C_1(1 + r)$
B. PV = $C_1/(1 + r)$
C. PV = C_1/r
D. None of the above

Type: Medium

16. The net present value formula for one period is:
I) $NPV = C_0 + [C_1/(1 + r)]$; II) $NPV = PV$ required investment; and III) $NPV = C_0/C_1$
A. I only
B. I and II only
C. III only
D. None of the above

Type: Medium

17. An initial investment of $400,000 will produce an end of year cash flow of $480,000.
What is the NPV of the project at a discount rate of 20%?
A. $176,000
B. $80,000
C. $0 (zero)
D. None of the above

$NPV = -400,000 + (480,000/1.2) = 0$

Type: Medium

18. If the present value of a cash flow generated by an initial investment of $200,000 is
$250,000,
what is the NPV of the project?
A. $250,000
B. $50,000
C. $200,000
D. None of the above

$NPV = -200,000 + 250,000 = 50,000$

Type: Easy

19. What is the present value of the following cash flow at a discount rate of 9%?

Year 1	Year 2	Year 3
$100,000	$150,000	$200,000

A. $372,431.81
B. $450,000
C. $405,950.68
D. None of the above

PV = (100,000/1.09) + (150,000/(1.09^2)) + 200,000/(1.09^3) = 372,431.81

Type: Medium

20. At an interest rate of 10%, which of the following cash flows should you prefer?

	Year 1	Year 2	Year 3
A)	500	300	100
B)	100	300	500
C)	300	300	300
D)	Any of the above as they all add up to $900		

A. Option A
B. Option B
C. Option C
D. Option D

PV(A) = 777.61; PV(B) = 714.50; PV(C) = 746.05; A is preferred

Type: Medium

21. What is the net present value of the following cash flow at a discount rate of 11%?

t=0	t=1	t=2
-120,000	300,000	-100,000

A. $69,108.03
B. $231,432.51
C. $80,000
D. None of the above

NPV = -120,000 + (300,000/1.11) -(100,000/(1.11^2)) = 69,108.03

Type: Medium

22. What is the present value of the following cash flow at a discount rate of 16% APR?

t=1	t=2
-100,000	300,000

A. $136,741.97
B. $122,948.87
C. $158,620.69
D. None of the above

PV = (-100,000/1.16) + (300,000/(1.16^2)) = 136,741.97

Type: Medium

23. What is the net present value (NPV) of the following cash flows at a discount rate of 9%?

t = 0	t = 1	t=2	t=3
-250,000	100,000	150,000	200,000

A. $122,431.81
B. $200,000
C. $155,950.68
D. None of the above

NPV = -250,000 + (100,000/1.09) + (150,000/(1.09^2)) + (200,000/(1.09^3))
NPV = 122,431.81

Type: Medium

24. The following statements regarding the NPV rule and the rate of return rule are true except:
A. Accept a project if its NPV > 0
B. Reject a project if the NPV < 0
C. Accept a project if its rate of return > 0
D. Accept a project if its rate of return > opportunity cost of capital

Type: Difficult

25. An initial investment of $500 produces a cash flow $550 one year from today. Calculate the rate of return on the project
A. 10%
B. 15%
C. 25%
D. none of the above

Rate of return = (550 - 500)/500 = 10%

Type: Easy

26. According to the net present value rule, an investment in a project should be made if the:
A. Net present value is greater than the cost of investment
B. Net present value is greater than the present value of cash flows
C. Net present value is positive
D. Net present value is negative

Type: Difficult

27. Which of the following statements regarding the net present value rule and the rate of return rule is not true?
A. Accept a project if NPV > cost of investment
B. Accept a project if NPV is positive
C. Accept a project if return on investment exceeds the rate of return on an equivalent investment in the financial market
D. Reject a project if NPV is negative

Type: Difficult

28. The opportunity cost of capital for a risky project is
A. The expected rate of return on a government security having the same maturity as the project
B. The expected rate of return on a well-diversified portfolio of common stocks
C. The expected rate of return on a portfolio of securities of similar risks as the project
D. None of the above

Type: Difficult

29. A perpetuity is defined as:
A. Equal cash flows at equal intervals of time for a specific number of periods
B. Equal cash flows at equal intervals of time forever
C. Unequal cash flows at equal intervals of time forever
D. None of the above

Type: Easy

30. Which of the following is generally considered an example of a perpetuity:
A. Interest payments on a 10-year bond
B. Interest payments on a 30-year bond
C. Consols
D. None of the above

Type: Easy

31. You would like to have enough money saved to receive $100,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments start one year from the date of your retirement. The interest rate is 12.5%)?
A. $1,000,000
B. $10,000,000
C. $800,000
D. None of the above

PV = (100,000/0.125) = 800,000

Type: Medium

32. What is the present value of $10,000 per year perpetuity at an interest rate of 10%?
A. $10,000
B. $100,000
C. $200,000
D. None of the above

PV = (10,000/0.1) = 100,000

Type: Easy

33. You would like to have enough money saved to receive $80,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments start one year from the date of your retirement. The interest rate is 8%)?
A. $7,500,000
B. $750,000
C. $1,000,000
D. None of the above

PV = (80,000/0.08) = 1,000,000

Type: Medium

34. You would like to have enough money saved to receive a $50,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments starts on the day of retirement. The interest rate is 8%)?
A. $1,000,000
B. $675,000
C. $625,000
D. None of the above

PV = [(50,000/0.08)](1.08) = 675,000

Type: Difficult

35. You would like to have enough money saved to receive an $80,000 per year perpetuity after retirement so that you and your family can lead a good life. How much would you need to save in your retirement fund to achieve this goal (assume that the perpetuity payments starts on the day of retirement. The interest rate is 10%)?
A. $1,500,000
B. $880,000
C. $800,000
D. None of the above

PV = [(80,000/0.1)] * (1.1) = 880,000

Type: Difficult

36. An annuity is defined as
A. Equal cash flows at equal intervals of time for a specified period of time
B. Equal cash flows at equal intervals of time forever
C. Unequal cash flows at equal intervals of time forever
D. None of the above

Type: Easy

37. If you receive $1,000 payment at the end each year for the next five years, what type of cash flow do you have?
A. Uneven cash flow stream
B. An annuity
C. An annuity due
D. None of the above

Type: Easy

38. If the three-year present value annuity factor is 2.673 and two-year present value annuity factor is 1.833, what is the present value of $1 received at the end of the 3 years?
A. $1.1905
B. $0.84
C. $0.89
D. None of the above

PV = (2.673 - 1.833) * (1) = 0.84

Type: Difficult

39. If the five-year present value annuity factor is 3.60478 and four-year present value annuity factor is 3.03735, what is the present value at the $1 received at the end of five years?
A. $0.63552
B. $1.76233
C. $0.56743
D. None of the above

PV = (3.60478 - 3.03735) * (1) = 0.56743

Type: Difficult

40. What is the present value annuity factor at a discount rate of 11% for 8 years?
A. 5.7122
B. 11.8594
C. 5.1461
D. None of the above

PV annuity factor = (1/0.11) - (1/((0.11)(1.11^8))) = 5.1461

Type: Medium

41. What is the present value annuity factor at an interest rate of 9% for 6 years?
A. 7.5233
B. 4.4859
C. 1.6771
D. None of the above

PV annuity factor = (1/0.09) - (1/((0.09)(1.09^6))) = 4.4859

Type: Medium

42. What is the present value of $1000 per year annuity for five years at an interest rate of 12%?
A. $6,352.85
B. $3,604.78
C. $567.43
D. None of the above

PV annuity factor = [(1/0.12) - (1/((0.12)(1.12^ 5)))] * 1000 = 3,604.78

Type: Medium

43. What is the present value of $5000 per year annuity at a discount rate of 10% for 6 years?
A. $21,776.30
B. $3,371.91
C. $16,760.78
D. None of the above

PV = [(1/0.10) - (1/((0.10)(1.10^6)))] * 5000 = 16,760.78

Type: Medium

44. After retirement, you expect to live for 25 years. You would like to have $75,000 income each year. How much should you have saved in the retirement to receive this income, if the interest is 9% per year (assume that the payments start on the day of retirement)?
A. $736,693.47
B. $802,995.88
C. $2,043,750
D. None of the above

PV = [[(1/0.09) - (1/((0.09)(1.09^25)))] * 75,000] * (1.09) = 802,995.88

Type: Difficult

45. After retirement, you expect to live for 25 years. You would like to have $75,000 income each year. How much should you have saved in the retirement to receive this income, if the interest is 9% per year (assume that the payments start one year after the retirement)?
A. $736,693.47
B. $6,352,567.22
C. $1,875,000
D. None of the above

PV = [(1/0.09) - (1/((0.09)(1.09^25)))] * 75,000 = 736,693.47

Type: Difficult

46. For $10,000 you can purchase a 5-year annuity that will pay $2504.57 per year for five years. The payments are made at the end of each year. Calculate the effective annual interest rate implied by this arrangement: (approximately)
A. 8%
B. 9%
C. 10%
D. None of the above

Using a financial calculator: N = 5; PV = -10,000; PMT = 2504.57; FV = 0
Compute: I = 8.0% [calculator setting: END]

Type: Medium

47. If the present value annuity factor for 10 years at 10% interest rate is 6.1446, what is the present value annuity factor for an equivalent annuity due?
A. 6.1446
B. 7.38
C. 6.759
D. None of the above

Annuity due: 6.1446 * 1.1 = 6.759

Type: Difficult

48. If the present annuity factor is 3.8896, what is the present value annuity factor for an equivalent annuity due if the interest rate is 9%?
A. 3.5684
B. 4.2397
C. 3.8896
D. None of the above.

annuity due factor = 3.8896 * 1.09 = 4.2397

Type: Medium

49. For $10,000 you can purchase a 5-year annuity that will pay $2358.65 per year for five years. The payments are made at the beginning of each year. Calculate the effective annual interest rate implied by this arrangement: (approximately)
A. 8%
B. 9%
C. 10%
D. none of the above

Using a financial calculator: N = 5; PV = -10,000; PMT = 2358.65; FV = 0
Compute: I = 9.0% [Calculator setting: BEGIN (BGN)]

Type: Medium

50. John House has taken a $250,000 mortgage on his house at an interest rate of 6% per year. If the mortgage calls for twenty equal annual payments, what is the amount of each payment?
A. $21,796.14
B. $10,500.00
C. $16,882.43
D. None of the above

(Use a financial calculator) PV = 250,000; I - = 6%; N = 20; FV = 0;
Compute PMT = $21,796.14

Type: Difficult

51. John House has taken a 20-year, $250,000 mortgage on his house at an interest rate of 6% per year. What is the value of the mortgage after the payment of the fifth annual installment?
A. $128,958.41
B. $211,689.53
C. $141,019.50
D. None of the above

Step 1: I = 6%; N = 20; PV = 250,000; FV = 0; Compute PMT = 21,796.14
Step 2: I = 6%; N = 15; PMT = 21,796.14; Compute PV = 211,689. 53

Type: Difficult

52. If the present value of $1.00 received n years from today at an interest rate of r is 0.3855, then what is the future value of $1.00 invested today at an interest rate of r% for n years?
A. $1.3855
B. $2.594
C. $1.70
D. Not enough information to solve the problem

FV = 1/(0.3855) = 2.594

Type: Difficult

53. If the present value of $1.00 received n years from today at an interest rate of r is 0.621, then what is the future value of $1.00 invested today at an interest rate of r% for n years?
A. $1.00
B. $1.61
C. $1.621
D. Not enough information to solve the problem

FV = 1/(0.621) = 1.61

Type: Difficult

54. If the future value of $1 invested today at an interest rate of r% for n years is 9.6463, what is the present value of $1 to be received in n years at r% interest rate?
A. $9.6463
B. $1.00
C. $0.1037
D. None of the above

PV = 1/9.6463 = 0.1037

Type: Difficult

55. If the future value annuity factor at 10% and 5 years is 6.1051, calculate the equivalent present value annuity factor
A. 6.1051
B. 3.7908
C. 6.7156
D. None of the given ones

PV = 6.1051/(1.1)^5 = 3.7908

Type: Difficult

56. If the present value annuity factor at 10% APR for 10 years is 6.1446, what is the equivalent future value annuity factor?
A. 3.108
B. 15.9374
C. 2.5937
D. None of the above

FV annuity factor = 6.1446 * (1.1^10) = 15.9374

Type: Difficult

57. If the present value annuity factor at 12% APR for 5 years is 3.6048, what is the equivalent future value annuity factor?
A. 2.0455
B. 6.3529
C. 1.7623
D. None of the above

FV annuity factor = 3.6048 * (1.12^5) = 6.3529

Type: Difficult

58. If the present value annuity factor at 8% APR for 10 years is 6.71, what is the equivalent future value annuity factor?
A. 3.108
B. 14.487
C. 2.159
D. None of the above

FV annuity factor = 6.71 * (1.08^10) = 14.487

Type: Difficult

59. You are considering investing in a retirement fund that requires you to deposit $5,000 per year, and you want to know how much the fund will be worth when you retire. What financial technique should you use to calculate this value?
A. Future value of a single payment
B. Future value of an annuity
C. Present value of an annuity
D. None of the above

Type: Easy

60. Mr. Hopper is expected to retire in 25 years and he wishes accumulate $750,000 in his retirement fund by that time. If the interest rate is 10% per year, how much should Mr. Hopper put into the retirement fund each year in order to achieve this goal? [Assume that the payments are made at the end of each year]
A. $4,559.44
B. $2,500
C. $7,626.05
D. None of the above

Future value annuity factor = [(1.1^25) - 1]/(0.1) = 98.347;
payment = 750,000/98.347 = 7626.05

Type: Difficult

61. Mr. Hopper is expected to retire in 30 years and he wishes accumulate $1,000,000 in his retirement fund by that time. If the interest rate is 12% per year, how much should Mr. Hopper put into the retirement fund each year in order to achieve this goal?
A. $4,143.66
B. $8,287.32
C. $4,000
D. None of the above

Future value annuity factor = [(1.12^30 - 1]/(0.12) = 241.3327;
payment = 1,000,000/241.3327 = 4143.66

Type: Difficult

62. You would like to have enough money saved to receive a growing annuity for 20 years, growing at a rate of 5% per year, the first payment being $50,000 after retirement. That way, you hope that you and your family can lead a good life after retirement. How much would you need to save in your retirement fund to achieve this goal.(assume that the growing annuity payments start one year from the date of your retirement. The interest rate is 10%)?
A. $1,000,000
B. $425,678.19
C. $605,604.20
D. None of the above

PV = (50,000)[(1/(0.1 - 0.05)) - {(1/(0.1 - 0.05)}{(1.05^20)/(1.10^20)}] = 605,604.20

Type: Difficult

63. You would like to have enough money saved to receive a growing annuity for 25 years, growing
at a rate of 4% per year, the first payment being $60,000 after retirement, so that you and your
family can lead a good life. How much would you need to save in your retirement fund to
achieve this goal? (assume that the growing perpetuity payments start one year from the date of
your retirement. The interest rate is 12%)?
A. $1,500,000
B. $632,390
C. $452,165
D. None of the above

PV = (60,000) [(1/(0.12 - 0.04)) - {(1/(0.12 - 0.04)}{(1.04^25)/(1.12^25)}] = 632,390

Type: Difficult

64. The discount rate is used for calculating the NPV is:
A. Determined by the financial markets
B. Found by the government
C. Found by the CEO
D. None of the above

Type: Easy

65. The managers of a firm can maximize stockholder wealth by:
A. Taking all projects with positive NPVs
B. Taking all projects with NPVs greater than the cost of investment
C. Taking all projects with NPVs greater than present value of cash flow
D. All of the above

Type: Medium

66. If you invest $100 at 12% APR for three years, how much would you have at the end of 3 years using simple interest?
A. $136
B. $140.49
C. $240.18
D. None of the above

FV = 100 + (100 * 0.12 * 3) = $136

Type: Medium

67. If you invest $100 at 12% APR for three years, how much would you have at the end of 3 years using compound interest?
A. $136
B. $140.49
C. $240.18
D. None of the above

FV = 100 * (1.12^3) = $140.49

Type: Medium

68. Which of the following statements is true?
A. The process of discounting is the inverse of the process of compounding.
B. Ending balances using simple interest is always greater than the ending balance using compound interest at positive interest rates.
C. Present value of an annuity due is always less than the present value of an equivalent annuity at positive interest rates.
D. All of the above are true.

Type: Difficult

69. The concept of compound interest is most appropriately described as:
A. Interest earned on an investment
B. The total amount of interest earned over the life of an investment
C. Interest earned on interest
D. None of the above

Type: Medium

70. Ms. Colonial has just taken out a $150,000 mortgage at an interest rate of 6% per year. If the mortgage calls for equal monthly payments for twenty years, what is the amount of each payment? (Assume monthly compounding or discounting.)
A. $1254.70
B. $1625.00
C. $1263.06
D. None of the above are true

PMT = 150,000/[(1/0.005) - 1/((0.005 * ((1 + 0.005)^240)))] = $1254.70

Type: Difficult

71. An investment at 10.47% effective rate compounded monthly is equal to a nominal (annual) rate of:
A. 10.99%
B. 9.57%
C. 10%
D. None of the above

NOM = [(1.1047)^(1/12) - 1] * 12 = 0.1 = 10.00%

Type: Medium

72. An investment at 12% nominal rate compounded monthly is equal to an annual rate of:
A. 12.68%
B. 12.36%
C. 12%
D. None of the above

EAR = ((1.01)^12) - 1 = 0.12681 = 12.68%

Type: Medium

73. Mr. William expects to retire in 30 years and would like to accumulate $1 million in the pension fund. If the annual interest rate is 12% per year, how much should Mr. Williams put into the pension fund each month in order to achieve his goal? Assume that Mr. Williams will deposit the same amount each month into his pension fund and also use monthly compounding.
A. $286.13
B. $771.60
C. $345.30
D. None of the above

PMT = 1,000,000/{[(1/0.01) - (1/(0.01 * (1.01^360)))] * (1.01^360)} = $286.13

Type: Difficult

74. An investment at 10% nominal rate compounded continuously is equal to an equivalent annual rate of:
A. 10.250%
B. 10.517%
C. 10.381%
D. None of the above

(e^(0.1)) - 1 = 0.10517 = 10.517%

Type: Difficult

75. The present value of a $100 per year perpetuity at 10% per year interest rate is $1000. What would be the present value if the payments were compounded continuously?
A. $1000.00
B. $1049.21
C. $1024.40
D. None of the above

$(e^r) = 1.1$ r = ln(1.1) = 0.09531; PV = 100/0.09531 = $1049.21

Type: Difficult

True / False Questions

76. The rate of return, discount rate, hurdle rate or opportunity cost of capital all means the same.
TRUE

Type: Medium

77. A dollar today is worth more than a dollar tomorrow if the interest rate is positive.
TRUE

Type: Easy

78. The present value of a future cash flow can be found by dividing it by an appropriate discount factor.
FALSE

Type: Medium

79. Net present value is found by subtracting the required investment from the present value of future cash flows.
TRUE

Type: Medium

80. The opportunity cost of capital is higher for safe investments than for risky ones.
FALSE

Type: Medium

81. A safe dollar is always worth less than a risky dollar because the rate of return on a safe investment is generally low and the rate of return on a risky investment is generally high.
FALSE

Type: Difficult

82. "Accept investments that have positive net present values" is called the net present value rule.
TRUE

Type: Medium

83. "Accept investments that offer rates of return in excess of opportunity cost of capital".
TRUE

Type: Medium

84. The rate of return on any perpetuity is equal to the cash flow multiplied by the price.
FALSE

Type: Medium

85. An annuity is an asset that pays a fixed sum each year for a specified number of years.
TRUE

Type: Easy

86. The value of a five-year annuity is equal to the sum of two perpetuities. One makes its first
payment in year 1, and the other makes its first payment in year 6.
FALSE

Type: Difficult

87. An equal-payment home mortgage is an example of an annuity.
TRUE

Type: Medium

88. In the amortization of a mortgage loan with equal payments, the fraction of each payment devoted to interest steadily increases over time and the fraction devoted to reducing the loan decreases steadily.
TRUE

Type: Difficult

89. In the case of a growing perpetuity, the present value of the cash flow is given by:
$[C_1/(r - g)]$ where $r > g$.
TRUE

Type: Difficult

90. Compound interest assumes that you are reinvesting the interest payments at the rate of return.
TRUE

Type: Medium

Short Answer Questions

91. Briefly explain the term "discount rate."

Discount rate is the rate of return used for discounting future cash flows to obtain the present value. The discount rate can be obtained by looking at the rate of return, an equivalent investment opportunity in the capital market.

Type: Difficult

92. Intuitively explain the concept of the present value.

If you have $100 today, you can invest it and start earning interest on it. On the other hand, if you have to make a payment of $100 one year from today, you do not need to invest $100 today but a lesser amount. The lesser amount invested today plus the interest earned on it should add up to $100. The present value of $100 one year from today at an interest rate of 10% is $90.91. [PV = 100/1.1 = 90.91]

Type: Difficult

93. State the "net present value rule."

Invest in projects with positive net present values. Net present value is the difference between the present value of future cash flows from the project and the initial investment.

Type: Medium

94. Briefly explain the concept of risk.

If the future cash flows from an investment are not certain then we call it a risky cash flow. That means there is an uncertainty about the future cash flows or future cash flows could be different from expected cash flows. The degree of uncertainty varies from investment to investment. Generally, uncertain cash flows are discounted using a higher discount rate than certain cash flows. This is only one method of dealing with risk. There are many ways to take risk into consideration while making financial decisions.

Type: Difficult

95. State the "rate of return rule."

Invest as long as the rate of return on the investment exceeds the rate of return on equivalent investments in the capital market.

Type: Medium

96. Discuss why a dollar tomorrow cannot be worth less than a dollar the day after tomorrow.

If a dollar tomorrow is worth less than a dollar a day after tomorrow, it would be possible to earn a very large amount of money through "money machine" effect. This is only possible, if someone else is losing a very large amount of money. These conditions can only exist for a short period of time, and cannot exist in equilibrium as the source of money is quickly exhausted. Thus a dollar tomorrow cannot be worth less than a dollar the day after tomorrow.

Type: Difficult

97. Define the term "perpetuity."

A perpetuity is defined as the same cash flow occurring each year forever.

Type: Medium

98. Describe how you would go about finding the present value of any annuity given the formula for
the present value of a perpetuity.

The present value of any annuity can be thought of as the difference between two perpetuities one payment stating in year-1 (immediate) and one starting in year (n + 1) (delayed). By calculating difference between the present values of these two perpetuities today we can find the present value of an annuity.

Type: Medium

99. What is the difference between simple interest and compound interest?

When money is invested at compound interest, each interest payment is reinvested to earn more interest in subsequent periods. In the simple interest case, the interest is paid only on the initial investment.

Type: Medium

100. Briefly explain, "continuous compounding."

As frequency of compounding increases, the effective rate on an investment also increases. In case of continuous compounding the frequency of compounding is infinity. In this case, the nature of the function also changes. The effective interest rate is given by $(e^r - 1)$, where the value of e = 2.718. e is the base for natural logarithms.

Type: Difficult