

Chapter 25(10)

Capital Investment Analysis

OBJECTIVES

Obj 1	Explain the nature and importance of capital investment analysis.
Obj 2	Evaluate capital investment proposals, using the following methods: average rate of return, cash payback, net present value, and internal rate of return.
Obj 3	List and describe factors that complicate capital investment analysis.
Obj 4	Diagram the capital rationing process.

TRUE/FALSE

1. The process by which management plans, evaluates, and controls long-term investment decisions involving fixed assets is called capital investment analysis.

ANS: T DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

2. The process by which management plans, evaluates, and controls long-term investment decisions involving fixed assets is called cost-volume-profit analysis.

ANS: F DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

3. Care must be taken involving capital investment decisions, since normally a long-term commitment of funds is involved and operations could be affected for many years.

ANS: T DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

4. Only managers are encouraged to submit capital investment proposals because they know the processes and are able to match investments with long-term goals.

ANS: F DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

5. The methods of evaluating capital investment proposals can be grouped into two general categories that can be referred to as (1) methods that ignore present value and (2) present values methods.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

6. The methods of evaluating capital investment proposals can be grouped into two general categories that can be referred to as (1) average rate of return and (2) cash payback methods.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

7. Average rate of return equals average investment divided by estimated average annual income.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

8. Average rate of return equals estimated average annual income divided by average investment.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

9. The method of analyzing capital investment proposals in which the estimated average annual income is divided by the average investment is the average rate of return method.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

10. The excess of the cash flowing in from revenues over the cash flowing out for expenses is termed net cash flow.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

11. The excess of the cash flowing in from revenues over the cash flowing out for expenses is termed net discounted cash flow.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

12. The computations involved in the net present value method of analyzing capital investment proposals are less involved than those for the average rate of return method.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

13. The computations involved in the net present value method of analyzing capital investment proposals are more involved than those for the average rate of return method.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

14. Methods that ignore present value in capital investment analysis include the cash payback method.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

15. Methods that ignore present value in capital investment analysis include the average rate of return method.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

16. Methods that ignore present value in capital investment analysis include the internal rate of return method.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

17. Methods that ignore present value in capital investment analysis include the net present value method.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

18. The average rate of return method of capital investment analysis gives consideration to the present value of future cash flows.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

19. The cash payback method of capital investment analysis is one of the methods referred to as a present value method.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

20. The anticipated purchase of a fixed asset for \$400,000, with a useful life of 5 years and no residual value, is expected to yield total net income of \$300,000 for the 5 years. The expected average rate of return is 30%.

ANS: T DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

21. The anticipated purchase of a fixed asset for \$400,000, with a useful life of 5 years and no residual value, is expected to yield total net income of \$300,000 for the 5 years. The expected average rate of return is 37.5%.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

22. The anticipated purchase of a fixed asset for \$400,000, with a useful life of 5 years and no residual value, is expected to yield total net income of \$200,000 for the 5 years. The expected average rate of return on investment is 50%.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

23. The anticipated purchase of a fixed asset for \$400,000, with a useful life of 5 years and no residual value, is expected to yield total net income of \$200,000 for the 5 years. The expected average rate of return on investment is 25.0%.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

24. In net present value analysis for a proposed capital investment, the expected future net cash flows are averaged and then reduced to their present values.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

25. The expected period of time that will elapse between the date of a capital investment and the complete recovery in cash of the amount invested is called the discount period.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

26. The expected period of time that will elapse between the date of a capital investment and the complete recovery in cash of the amount invested is called the cash payback period.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

27. If a proposed expenditure of \$80,000 for a fixed asset with a 4-year life has an annual expected net cash flow and net income of \$32,000 and \$12,000, respectively, the cash payback period is 2.5 years.

ANS: T DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

28. If a proposed expenditure of \$80,000 for a fixed asset with a 4-year life has an annual expected net cash flow and net income of \$32,000 and \$12,000, respectively, the cash payback period is 4 years.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

29. For years one through five, a proposed expenditure of \$250,000 for a fixed asset with a 5-year life has expected net income of \$40,000, \$35,000, \$25,000, \$25,000, and \$25,000, respectively, and net cash flows of \$90,000, \$85,000, \$75,000, \$75,000, and \$75,000, respectively. The cash payback period is 3 years.

ANS: T DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

30. For years one through five, a proposed expenditure of \$500,000 for a fixed asset with a 5-year life has expected net income of \$40,000, \$35,000, \$25,000, \$25,000, and \$25,000, respectively, and net cash flows of \$90,000, \$85,000, \$75,000, \$75,000, and \$75,000, respectively. The cash payback period is 5 years.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

31. In net present value analysis for a proposed capital investment, the expected future net cash flows are reduced to their present values.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

32. If in evaluating a proposal by use of the net present value method there is a deficiency of the present value of future cash inflows over the amount to be invested, the proposal should be rejected.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

33. If in evaluating a proposal by use of the net present value method there is a deficiency of the present value of future cash inflows over the amount to be invested, the proposal should be accepted.

ANS: F DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

34. If in evaluating a proposal by use of the net present value method there is an excess of the present value of future cash inflows over the amount to be invested, the rate of return on the proposal exceeds the rate used in the analysis.

ANS: T DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

35. If in evaluating a proposal by use of the net present value method there is an excess of the present value of future cash inflows over the amount to be invested, the rate of return on the proposal is less than the rate used in the analysis.

ANS: F DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

36. A present value index can be used to rank competing capital investment proposals when the net present value method is used.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

37. The internal rate of return method of analyzing capital investment proposals uses the present value concept to compute an internal rate of return expected from the proposals.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

38. A series of equal cash flows at fixed intervals is termed an annuity.

ANS: T DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

39. A qualitative characteristic that may impact upon capital investment analysis is the impact of investment proposals on product quality.

ANS: T DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

40. A qualitative characteristic that may impact upon capital investment analysis is manufacturing flexibility.

ANS: T DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

41. A qualitative characteristic that may impact upon capital investment analysis is employee morale.

ANS: T DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

42. A qualitative characteristic that may impact upon capital investment analysis is manufacturing productivity.

ANS: T DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

43. A qualitative characteristic that may impact upon capital investment analysis is manufacturing control.

ANS: T DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

44. Charitable contributions are often used as a means of reducing the amount of income tax expense arising from capital investment projects.

ANS: F DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

45. The process by which management allocates available investment funds among competing capital investment proposals is termed present value analysis.

ANS: F DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

46. The process by which management allocates available investment funds among competing capital investment proposals is termed capital rationing.

ANS: T DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

47. A capital expenditures budget summarizes the decisions made for the acquisition of fixed assets for several future years.

ANS: T DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

48. Capital rationing is the process by which management decides how to divide the capital budget among the various departments or divisions in the company.

ANS: F DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

MULTIPLE CHOICE

1. The process by which management plans, evaluates, and controls long-term investment decisions involving fixed assets is called:

- a. absorption cost analysis
- b. variable cost analysis
- c. capital investment analysis
- d. cost-volume-profit analysis

ANS: C DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

2. Decisions to install new equipment, replace old equipment, and purchase or construct a new building are examples of

- a. sales mix analysis.
- b. variable cost analysis.
- c. capital investment analysis.
- d. variable cost analysis.

ANS: C DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

3. Which of the following is important when evaluating long-term investments?

- a. Investments must earn a reasonable rate of return
- b. Employees are able to determine and propose capital equipment for their divisions or departments
- c. Proposals should match long term goals.
- d. All of the above.

ANS: D DIF: Easy OBJ: 25(10)-01

NAT: AACSB Analytic | IMA-Investment Decisions

4. Which of the following are present value methods of analyzing capital investment proposals?

- a. Internal rate of return and average rate of return
- b. Average rate of return and net present value
- c. Net present value and internal rate of return
- d. Net present value and payback

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

5. Which of the following is a present value method of analyzing capital investment proposals?
- Average rate of return
 - Cash payback method
 - Accounting rate of return
 - Net present value

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

6. By converting dollars to be received in the future into current dollars, the present value methods take into consideration that money:
- has an international rate of exchange
 - is the language of business
 - is the measure of assets, liabilities, and stockholders' equity on financial statements
 - has a time value

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

7. Which of the following are two methods of analyzing capital investment proposals that both ignore present value?
- Internal rate of return and average rate of return
 - Net present value and average rate of return
 - Internal rate of return and net present value
 - Average rate of return and cash payback method

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

8. The method of analyzing capital investment proposals that divides the estimated average annual income by the average investment is:
- cash payback method
 - net present value method
 - internal rate of return method
 - average rate of return method

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

9. The primary advantages of the average rate of return method are its ease of computation and the fact that:
- it is especially useful to managers whose primary concern is liquidity
 - there is less possibility of loss from changes in economic conditions and obsolescence when the commitment is short-term
 - it emphasizes the amount of income earned over the life of the proposal
 - rankings of proposals are necessary

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

10. The expected average rate of return for a proposed investment of \$600,000 in a fixed asset, with a useful life of four years, straight-line depreciation, no residual value, and an expected total net income of \$216,000 for the 4 years, is:
- 18%
 - 15%
 - 27%
 - 9%

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

11. The amount of the average investment for a proposed investment of \$60,000 in a fixed asset, with a useful life of four years, straight-line depreciation, no residual value, and an expected total net income of \$21,600 for the 4 years, is:
- \$10,800
 - \$21,600
 - \$ 5,400
 - \$30,000

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

12. The amount of the estimated average income for a proposed investment of \$60,000 in a fixed asset, giving effect to depreciation (straight-line method), with a useful life of four years, no residual value, and an expected total income yield of \$21,600, is:
- \$10,800
 - \$21,600
 - \$ 5,400
 - \$30,000

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

13. An anticipated purchase of equipment for \$400,000, with a useful life of 8 years and no residual value, is expected to yield the following annual net incomes and net cash flows:

<u>Year</u>	<u>Net Income</u>	<u>Net Cash Flow</u>
1	\$60,000	\$110,000
2	50,000	100,000
3	50,000	100,000
4	40,000	90,000
5	40,000	90,000
6	40,000	90,000
7	40,000	90,000
8	40,000	90,000

What is the cash payback period?

- 5 years
- 4 years
- 6 years
- 3 years

ANS: B DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

14. Which method for evaluating capital investment proposals reduces the expected future net cash flows originating from the proposals to their present values and computes a net present value?
- a. Net present value
 - b. Average rate of return
 - c. Internal rate of return
 - d. Cash payback

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

15. Which of the following can be used to place capital investment proposals involving different amounts of investment on a comparable basis for purposes of net present value analysis?
- a. Price-level index
 - b. Present value factor
 - c. Annuity
 - d. Present value index

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

16. An analysis of a proposal by the net present value method indicated that the present value of future cash inflows exceeded the amount to be invested. Which of the following statements best describes the results of this analysis?
- a. The proposal is desirable and the rate of return expected from the proposal exceeds the minimum rate used for the analysis.
 - b. The proposal is desirable and the rate of return expected from the proposal is less than the minimum rate used for the analysis.
 - c. The proposal is undesirable and the rate of return expected from the proposal is less than the minimum rate used for the analysis.
 - d. The proposal is undesirable and the rate of return expected from the proposal exceeds the minimum rate used for the analysis.

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

17. Which method of evaluating capital investment proposals uses the concept of present value to compute a rate of return?
- a. Average rate of return
 - b. Accounting rate of return
 - c. Cash payback period
 - d. Internal rate of return

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

18. Which of the following is a method of analyzing capital investment proposals that ignores present value?
- a. Internal rate of return
 - b. Net present value
 - c. Discounted cash flow
 - d. Average rate of return

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

19. The methods of evaluating capital investment proposals can be separated into two general groups--present value methods and:
- past value methods
 - straight-line methods
 - cash payback methods
 - methods that ignore present value

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

20. The rate of earnings is 6% and the cash to be received in one year is \$10,000. Determine the present value amount, using the following partial table of present value of \$1 at compound interest:

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636

- \$9,090
- \$9,000
- \$9,430
- \$8,930

ANS: C DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

21. Using the following partial table of present value of \$1 at compound interest, determine the present value of \$20,000 to be received four years hence, with earnings at the rate of 10% a year:

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636

- \$13,660
- \$12,720
- \$15,840
- \$10,400

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

22. When several alternative investment proposals of the same amount are being considered, the one with the largest net present value is the most desirable. If the alternative proposals involve different amounts of investment, it is useful to prepare a relative ranking of the proposals by using a(n):
- average rate of return
 - consumer price index
 - present value index
 - price-level index

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

23. Which method of evaluating capital investment proposals uses present value concepts to compute the rate of return from the net cash flows expected from capital investment proposals?
- a. Internal rate of return
 - b. Cash payback
 - c. Net present value
 - d. Average rate of return

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

24. A series of equal cash flows at fixed intervals is termed a(n):
- a. present value index
 - b. price-level index
 - c. net cash flow
 - d. annuity

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

25. The present value index is computed using which of the following formulas?
- a. Amount to be invested/Average rate of return
 - b. Total present value of net cash flow/Amount to be invested
 - c. Total present value of net cash flow/Average rate of return
 - d. Amount to be invested/Total present value of net cash flow

ANS: B DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

26. Dukes Company is considering the acquisition of a machine that costs \$375,000. The machine is expected to have a useful life of 6 years, a negligible residual value, an annual cash flow of \$150,000, and annual operating income of \$87,500. What is the estimated cash payback period for the machine?
- a. 3 years
 - b. 4.3 years
 - c. 2.5 years
 - d. 5 years

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

27. The expected average rate of return for a proposed investment of \$4,800,000 in a fixed asset, using straight line depreciation, with a useful life of 20 years, no residual value, and an expected total net income of \$12,000,000 is:
- a. 25%
 - b. 18%
 - c. 40%
 - d. 12.5%

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

28. The present value factor for an annuity of \$1 is determined using which of the following formulas?
- Amount to be invested/Annual average net income
 - Annual net cash flow/Amount to be invested
 - Annual average net income/Amount to be invested
 - Amount to be invested/Annual net cash flow

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

The management of Arnold Corporation is considering the purchase of a new machine costing \$400,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

29. The cash payback period for this investment is:
- 5 years
 - 4 years
 - 2 years
 - 3 years

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

30. The average rate of return for this investment is:
- 18%
 - 16%
 - 58%
 - 10%

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

31. The management of Arnold Corporation is considering the purchase of a new machine costing \$430,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

The net present value for this investment is:

- a. positive \$36,400
- b. positive \$55,200
- c. Negative \$99,600
- d. Negative \$126,800

ANS: B **DIF:** Difficult **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

32. The management of Arnold Corporation is considering the purchase of a new machine costing \$400,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

The present value index for this investment is:

- a. .88
- b. 1.45
- c. 1.14
- d. .70

ANS: C **DIF:** Difficult **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

The management of Douglass Corporation is considering the purchase of a new machine costing \$375,000. The company's desired rate of return is 6%. The present value factor for an annuity of \$1 at interest of 6% for 5 years is 4.212. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$18,750	\$93,750
2	18,750	93,750
3	18,750	93,750
4	18,750	93,750
5	18,750	93,750

33. The cash payback period for this investment is:

- a. 4 years
- b. 5 years
- c. 20 years
- d. 3 years

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

34. The average rate of return for this investment is:

- a. 5%
- b. 10%
- c. 25%
- d. 15%

ANS: B DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

35. The net present value for this investment is:

- a. Negative \$118,145
- b. Positive \$118,145
- c. Positive \$19,875
- d. Negative \$19,875

ANS: C DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

36. The present value index for this investment is:

- a. 1.00
- b. .95
- c. 1.25
- d. 1.05

ANS: D DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

37. Hotaling Corporation is analyzing a capital expenditure that will involve a cash outlay of \$146,040. Estimated cash flows are expected to be \$30,000 annually for seven years. The present value factors for an annuity of \$1 for 7 years at interest of 6%, 8%, 10%, and 12% are 5.582, 5.206, 4.868, and 4.564, respectively. The internal rate of return for this investment is:
- 10%
 - 6%
 - 12%
 - 8%

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

38. Gossman Corporation is analyzing a capital expenditure that will involve a cash outlay of \$104,904. Estimated cash flows are expected to be \$36,000 annually for four years. The present value factors for an annuity of \$1 for 4 years at interest of 10%, 12%, 14%, and 15% are 3.170, 3.037, 2.914, and 2.855, respectively. The internal rate of return for this investment is:
- 2%
 - 2.4%
 - 14%
 - 3%

ANS: C DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

Below is a table for the present value of \$1 at Compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636
5	.747	.621	.567

Below is a table for the present value of an annuity of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.69
3	2.673	2.487	2.402
4	3.465	3.17	3.037
5	4.212	3.791	3.605

39. Using the tables above, what would be the present value of \$15,000 (rounded to the nearest dollar) to be received one year from today, assuming an earnings rate of 6%?
- \$13,500
 - \$14,145
 - \$15,500
 - \$12,272

ANS: B DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

40. Using the tables above, what would be the present value of \$8,000 (rounded to the nearest dollar) to be received two years from today, assuming an earnings rate of 12%?
- a. \$6,376
 - b. \$7,144
 - c. \$5,696
 - d. \$5,088

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

41. Using the tables above, what is the present value of \$3,000 (rounded to the nearest dollar) to be received at the end of each of the next 3 years, assuming an earnings rate of 10%?
- a. \$7,510
 - b. \$6,759
 - c. \$7,461
 - d. \$24,870

ANS: C DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

42. Using the tables above, if an investment is made now for \$20,000 that will generate a cash inflow of \$8,000 a year for the next 4 years, what would be the net present value (rounded to the nearest dollar) of the investment, (assuming an earnings rate of 12%)?
- a. \$20,352
 - b. \$352
 - c. \$24,296
 - d. \$4,296

ANS: D DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

43. Using the tables above, what would be the internal rate of return of an investment that required an investment of \$250,000, and would generate an annual cash inflow of \$65,946 for the next 5 years?
- a. 6%
 - b. 10%
 - c. 12%
 - d. cannot be determined from the data given.

ANS: B DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

44. Using the tables above, what would be the internal rate of return of an investment of \$242,550 and would generate an annual cash inflow of \$70,000 for the next 4 years?
- a. 6%
 - b. 10%
 - c. 12%
 - d. cannot be determined from the data given.

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

45. The expected average rate of return for a proposed investment of \$500,000 in a fixed asset, with a useful life of four years, straight-line depreciation, no residual value, and an expected total net income of \$240,000 for the 4 years, is:
- 18%
 - 48%
 - 24%
 - 12%

ANS: C DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

46. Which of the following is not an advantage of the average rate of return method?
- It is easy to use.
 - It takes into consideration the time value of money.
 - It includes the amount of income earned over the entire life of the proposal.
 - It emphasizes accounting income.

ANS: B DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

47. Which of the following is an advantage of the cash payback method?
- It is easy to use.
 - It takes into consideration the time value of money.
 - It includes the cash flow over the entire life of the proposal.
 - It emphasizes accounting income.

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

48. An anticipated purchase of equipment for \$500,000, with a useful life of 8 years and no residual value, is expected to yield the following annual net incomes and net cash flows:

<u>Year</u>	<u>Net Income</u>	<u>Net Cash Flow</u>
1	\$60,000	\$120,000
2	50,000	110,000
3	50,000	110,000
4	40,000	100,000
5	40,000	60,000
6	40,000	60,000
7	40,000	60,000
8	40,000	60,000

What is the cash payback period?

- 5 years
- 4 years
- 6 years
- 3 years

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

49. Using the following partial table of present value of \$1 at compound interest, determine the present value of \$20,000 to be received three years hence, with earnings at the rate of 10% a year:

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636

- a. \$14,240
- b. \$16,800
- c. \$15,020
- d. \$15,840

ANS: C DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

50. The rate of earnings is 10% and the cash to be received in two year is \$10,000. Determine the present value amount, using the following partial table of present value of \$1 at compound interest:

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636

- a. \$8,900
- b. \$9,090
- c. \$7,970
- d. \$8,260

ANS: D DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

51. Jakes Company is considering the acquisition of a machine that costs \$360,000. The machine is expected to have a useful life of 6 years, a negligible residual value, an annual cash flow of \$120,000, and annual operating income of \$83,721. What is the estimated cash payback period for the machine?

- a. 3 years
- b. 4.3 years
- c. 2.5 years
- d. 5 years

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

52. The expected average rate of return for a proposed investment of \$4,800,000 in a fixed asset, using straight line depreciation, with a useful life of 20 years, no residual value, and an expected total net income of \$8,640,000 is:
- a. 25%
 - b. 18%
 - c. 40%
 - d. 9.0%

ANS: B **DIF:** Moderate **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

53. The management of Arnold Corporation is considering the purchase of a new machine costing \$490,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

The cash payback period for this investment is:

- a. 5 years
- b. 4 years
- c. 2 years
- d. 3 years

ANS: B **DIF:** Easy **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

54. The management of Arnold Corporation is considering the purchase of a new machine costing \$400,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	60,000	120,000
3	30,000	100,000
4	10,000	90,000
5	10,000	90,000

The average rate of return for this investment is:

- a. 18%
- b. 21%
- c. 53%
- d. 10%

ANS: B **DIF:** Moderate **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

55. The management of Arnold Corporation is considering the purchase of a new machine costing \$430,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

The net present value for this investment is:

- a. positive \$16,400
- b. positive \$25,200
- c. Negative \$99,600
- d. Negative \$126,800

ANS: B **DIF:** Difficult **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

56. The management of Arnold Corporation is considering the purchase of a new machine costing \$420,000. The company's desired rate of return is 10%. The present value factors for \$1 at compound interest of 10% for 1 through 5 years are 0.909, 0.826, 0.751, 0.683, and 0.621, respectively. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$100,000	\$180,000
2	40,000	120,000
3	20,000	100,000
4	10,000	90,000
5	10,000	90,000

The present value index for this investment is:

- a. 1.08
- b. 1.45
- c. 1.14
- d. .70

ANS: A **DIF:** Difficult **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

57. The management of Douglass Corporation is considering the purchase of a new machine costing \$475,000. The company's desired rate of return is 6%. The present value factor for an annuity of \$1 at interest of 6% for 5 years is 4.212. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$20,000	\$95,000
2	20,000	95,000
3	20,000	95,000
4	20,000	95,000
5	20,000	95,000

The cash payback period for this investment is:

- a. 4 years
- b. 5 years
- c. 20 years
- d. 3 years

ANS: B **DIF:** Easy **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

The management of Douglass Corporation is considering the purchase of a new machine costing \$380,000. The company's desired rate of return is 6%. The present value factor for an annuity of \$1 at interest of 6% for 5 years is 4.212. In addition to the foregoing information, use the following data in determining the acceptability in this situation:

<u>Year</u>	<u>Income from Operations</u>	<u>Net Cash Flow</u>
1	\$20,000	\$95,000
2	20,000	95,000
3	20,000	95,000
4	20,000	95,000
5	20,000	95,000

58. The cash payback period for this investment is:

- a. 4 years
- b. 5 years
- c. 20 years
- d. 3 years

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

59. The average rate of return for this investment is:

- a. 5%
- b. 10.5%
- c. 25%
- d. 15%

ANS: B DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

60. The net present value for this investment is:

- a. Positive \$20,140
- b. Negative \$20,140
- c. Positive \$19,875
- d. Negative \$19,875

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

Below is a table for the present value of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636
5	.747	.621	.567

Below is a table for the present value of an annuity of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.690
3	2.673	2.487	2.402
4	3.465	3.170	3.037
5	4.212	3.791	3.605

61. Using the tables above, what would be the present value of \$15,000 (rounded to the nearest dollar) to be received at the end of each of the next two years, assuming an earnings rate of 6%?
- a. \$27,495
 - b. \$26,040
 - c. \$30,000
 - d. \$25,350

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

62. Using the tables above, what would be the present value of \$8,000 (rounded to the nearest dollar) to be received one year from today, assuming an earnings rate of 12%?
- a. \$7,544
 - b. \$7,120
 - c. \$7,272
 - d. \$7,144

ANS: D DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

63. Using the tables above, what is the present value of \$6,000 (rounded to the nearest dollar) to be received at the end of each of the next 4 years, assuming an earnings rate of 10%?
- a. \$20,790
 - b. \$19,020
 - c. \$14,412
 - d. \$25,272

ANS: B DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

64. Using the tables above, if an investment is made now for \$20,000 that will generate a cash inflow of \$7,000 a year for the next 4 years, what would be the net present value (rounded to the nearest dollar) of the investment cash inflows, (assuming an earnings rate of 12%)?
- \$20,352
 - \$3,969
 - \$22,190
 - \$21,259

ANS: D **DIF:** Moderate **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

65. The production department is proposing the purchase of an automatic insertion machine. They have identified 3 machines and have asked the accountant to analyze them to determine the best average rate of return.

	Machine A	Machine B	Machine C
Estimated Average Income	\$40,000	\$50,000	\$75,000
Average Investment	\$300,000	\$250,000	\$500,000

- Machine B
- Machine C
- Machine B or C
- Machine A

ANS: B

Machine A = $(\$40,000 / \$300,000) = 13.3\%$

Machine B = $(\$50,000 / \$250,000) = 20\%$

Machine C = $(\$75,000 / \$500,000) = 15\%$

DIF: Easy **OBJ:** 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

66. The production department is proposing the purchase of an automatic insertion machine. They have identified 3 machines and have asked the accountant to analyze them to determine the best cash payback.

	Machine A	Machine B	Machine C
Estimated Average Income	\$40,000	\$50,000	\$75,000
Average Investment	\$300,000	\$250,000	\$500,000

- a. Machine A
- b. Machine C
- c. Machine B
- d. All are equal.

ANS: B

$$A = \$300,000 / \$40,000 = 7.5 \text{ years}$$

$$B = \$250,000 / \$50,000 = 5 \text{ years}$$

$$C = \$500,000 / \$75,000 = 6.7 \text{ years}$$

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

67. The cash payback method is widely used in evaluating investments. The following are reasons why this method is used except:
- a. The longer the payback, the longer the estimated life of the asset.
 - b. The shorter the payback, the sooner the cash spend on the investment is recovered.
 - c. The shorter the payback, the least likely the possibility of obsolescence
 - d. All of the above are correct.

ANS: A DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

68. The production department is proposing the purchase of an automatic insertion machine. They have identified 3 machines and have asked the accountant to analyze them to determine which of the proposals (if any) meet the company's policy of a minimum desired rate of return of 10% using the net present value method. Each of the assets has a estimated useful life of 10 years.

	Machine A	Machine B	Machine C
Estimated Average Income	\$40,000	\$50,000	\$75,000
Average Investment	\$300,000	\$250,000	\$500,000

- a. A
- b. B
- c. C
- d. None of the above

ANS: B DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

69. The production department is proposing the purchase of an automatic insertion machine. They have identified 3 machines, each with an estimated life of 10 years. Which machine offers the best internal rate of return?

	Machine A	Machine B	Machine C
Annual net cash flows	\$40,000	\$50,000	\$75,000
Average investment	\$300,000	\$250,000	\$500,000

- a. Machine B
- b. Machine C
- c. Machine A and B
- d. Machine A

ANS: A DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

70. All of the following qualitative considerations may impact upon capital investments analysis except:

- a. manufacturing productivity
- b. manufacturing sunk cost
- c. manufacturing flexibility
- d. manufacturing control

ANS: B DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

71. All of the following qualitative considerations may impact upon capital investments analysis except:

- a. time value of money
- b. employee morale
- c. the impact on product quality
- d. manufacturing flexibility

ANS: A DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

72. Which of the following provisions of the Internal Revenue Code can be used to reduce the amount of the income tax expense arising from capital investment projects?

- a. Interest deduction
- b. Depreciation deduction
- c. Minimum tax provision
- d. Charitable contributions

ANS: B DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

73. Assume in analyzing alternative proposals that Proposal F has a useful life of six years and Proposal J has a useful life of nine years. What is one widely used method that makes the proposals comparable?
- a. Ignore the fact that Proposal F has a useful life of six years and treat it as if it has a useful life of nine years.
 - b. Adjust the life of Proposal J to a time period that is equal to that of Proposal F by estimating a residual value at the end of year six.
 - c. Ignore the useful lives of six and nine years and find an average (7 1/2 years).
 - d. Ignore the useful lives of six and nine years and compute the average rate of return.

ANS: B DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

74. Periods in time that experience increasing price levels are known as periods of:
- a. inflation
 - b. recession
 - c. depression
 - d. deflation

ANS: A DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

75. Which of the following is not considered as a complicating factor in capital investment decisions?
- a. Income Tax
 - b. Lease versus Capital Investment
 - c. Equal Proposal Lives
 - d. Qualitative Considerations

ANS: C DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

76. Which of the following would not be considered a good managerial tool in making a decision for determining a capital investment?
- a. Further evaluate assets that are dissimilar in nature or have different useful lives
 - b. Using only quantitative measures to purchase an asset
 - c. Analyzing the lease vs purchase option.
 - d. Consider income tax ramifications.

ANS: B DIF: Easy OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions

77. All of the following are factors that may complicate capital investment analysis except:
- a. the leasing alternative
 - b. changes in price levels
 - c. sunk cost
 - d. the federal income tax

ANS: C DIF: Moderate OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

78. The process by which management allocates available investment funds among competing investment proposals is called:
- a. investment capital
 - b. investment rationing
 - c. cost-volume-profit analysis
 - d. capital rationing

ANS: D DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

79. In capital rationing, an initial screening of alternative proposals is usually performed by establishing minimum standards. Which of the following evaluation method(s) are often used?
- a. Cash payback method and average rate of return method
 - b. Average rate of return method and net present value method
 - c. Net present value method and cash payback method
 - d. Internal rate of return and net present value methods

ANS: A DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

80. In capital rationing, alternative proposals that survive initial and secondary screening are normally evaluated in terms of:
- a. present value
 - b. non-financial factors
 - c. maximum cost
 - d. net cash flow

ANS: B DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

81. Capital rationing uses the following measures to determine the funding of projects except
- a. Ranks the proposals with the available funds.
 - b. Determines whether the project should be funded by using operating cash or the issuance of bonds.
 - c. Establish minimum standards by applying the cash payback and the average rate of return.
 - d. Qualitative factors are considered.

ANS: B DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

82. Capital rationing uses the following measures to determine the funding of projects except
- a. Ranks the proposals with the available funds.
 - b. Determines whether the project should be funded by using operating cash or the issuance of bonds.
 - c. Establish minimum standards by applying the cash payback and the average rate of return.
 - d. Qualitative factors are considered.

ANS: B DIF: Easy OBJ: 25(10)-04

NAT: AACSB Analytic | IMA-Investment Decisions

EXERCISE/OTHER

1. Determine the average rate of return for a project that is estimated to yield total income of \$300,000 over four years, cost \$720,000, and has a \$30,000 residual value.

ANS:

Estimated average annual income: \$75,000 (\$300,000 / 4 years)
Average investment: \$ 375,000 (\$720,000 + \$30,000) / 2
Average rate of return 20% (\$75,000 / \$375,000)

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-1

2. Determine the average rate of return for a project that is estimated to yield total income of \$250,000 over four years, cost \$480,000, and has a \$20,000 residual value.

ANS:

Estimated average annual income: \$62,500 (\$250,000 / 4 years)
Average investment: \$250,000 (\$480,000 + \$20,000) / 2
Average rate of return 25% (\$62,500 / \$250,000)

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-1

3. An 8-year project is estimated to cost \$360,000 and have no residual value. If the straight-line depreciation method is used and estimated total net income is \$86,400, determine the average rate of return.

ANS:

$$\frac{\text{Estimated Average Annual Income}}{\text{Average Investment}} = \frac{\$86,400/8}{(\$360,000 + \$0)/2} = 6\%$$

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

4. An 6-year project is estimated to cost \$350,000 and have no residual value. If the straight-line depreciation method is used and estimated total net income is \$126,000, determine the average rate of return.

ANS:

$$\frac{\text{Estimated Average Annual Income}}{\text{Average Investment}} = \frac{\$126,000/6}{(\$350,000 + \$0)/2} = 12\%$$

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

5. A project has estimated annual net cash flows of \$50,000. It is estimated to cost \$180,000. Determine the cash payback period.

ANS:

3.6 years (\$180,000 / \$50,000)

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-2

6. A project has estimated annual net cash flows of \$90,000. It is estimated to cost \$405,000. Determine the cash payback period.

ANS:

4.5 years (\$405,000 / \$90,000)

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-2

Below is a table for the present value of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636
5	.747	.621	.567

Below is a table for the present value of an annuity of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.690
3	2.673	2.487	2.402
4	3.465	3.170	3.037
5	4.212	3.791	3.605

7. A project has estimated annual cash flows of \$90,000 for four years and is estimated to cost \$250,000. Assume a minimum acceptable rate of return of 12%. Using the above tables determine the (a) net present value of the project and (b) the present value index, rounded to two decimal places.

ANS:

(a) \$23,330 [\$90,000 × 3.037] - \$250,000]

(b) 1.09 (\$273,330 / \$250,000)

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-3

8. A project has estimated annual cash flows of \$90,000 for three years and is estimated to cost \$250,000. Assume a minimum acceptable rate of return of 10%. Using the above tables determine the (a) net present value of the project and (b) the present value index, rounded to two decimal places.

ANS:

(a) -\$26,170 [$\$90,000 \times 2.487$] - \$250,000]

(b) .90 ($\$223,830 / \$250,000$)

DIF: Moderate

OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-3

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.690
3	2.673	2.487	2.402
4	3.465	3.170	3.037
5	4.212	3.791	3.605
6	4.917	4.355	4.111
7	5.582	4.868	4.564
8	6.210	5.335	4.968
9	6.802	5.759	5.328
10	7.360	6.145	5.650

9. A project is estimated to cost \$273,840 and provide annual cash flows of \$60,000 for seven years. Determine the internal rate of return for this project, using the above table.

ANS:

12% [$(\$273,840 / \$60,000) = 4.564$, the present value of an annuity factor for seven periods at 12%.

DIF: Difficult

OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-4

10. A project is estimated to cost \$372,600 and provide annual cash flows of \$60,000 for eight years. Determine the internal rate of return for this project, using the above table.

ANS:

6% [$(\$372,600 / \$60,000) = 6.21$, the present value of an annuity factor for eight periods at 6%.]

DIF: Difficult

OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-4

11. Project A requires an original investment of \$65,000. The project will yield cash flows of \$15,000 per year for seven years. Project B has a calculated net present value of \$5,500 over a five year life. Project A could be sold at the end of five years for a price of \$30,000. (a) Using the proper table below determine the net present value of Project A over a five-year life with salvage value assuming a minimum rate of return of 12%. (b) Which project provides the greatest net present value?

Below is a table for the present value of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636
5	.747	.621	.567

Below is a table for the present value of an annuity of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.690
3	2.673	2.487	2.402
4	3.465	3.170	3.037
5	4.212	3.791	3.605

ANS:

(a)

Present value of a \$15,000 five year annuity at 12%:	\$54,075 *
Present value of a \$30,000 amount, five years at 12%	<u>17,010**</u>
Total present value of Project A:	\$71,085
Total cost of Project A:	<u>65,000</u>
Net present value of Project A	<u>\$6,085</u>

*[\$15,000 × 3.605 (Present value of an annuity of \$1)]

**[\$30,000 × .567 (Present value of \$1)]

(b) Project A's net present value of \$6,085 is greater than the net present value of Project B, \$5,500.

DIF: Moderate OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-5

12. Project A requires an original investment of \$50,000. The project will yield cash flows of \$15,000 per year for seven years. Project B has a calculated net present value of \$13,500 over a five year life. Project A could be sold at the end of four years for a price of \$25,000. (a) Using the proper table below determine the net present value of Project A over a four-year life with salvage value assuming a minimum rate of return of 10%. (b) Which project provides the greatest net present value?

Below is a table for the present value of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	.890	.826	.797
3	.840	.751	.712
4	.792	.683	.636
5	.747	.621	.567

Below is a table for the present value of an annuity of \$1 at compound interest.

Year	6%	10%	12%
1	.943	.909	.893
2	1.833	1.736	1.690
3	2.673	2.487	2.402
4	3.465	3.170	3.037
5	4.212	3.791	3.605

ANS:

(a)

Present value of a \$15,000 four year annuity at 12%:	\$45,555 *
Present value of a \$25,000 amount, four years at 12%	<u>15,900**</u>
Total present value of Project A:	\$61,455
Total cost of Project A:	<u>50,000</u>
Net present value of Project A	<u>\$11,455</u>

*[\$15,000 × 3.037 (Present value of an annuity of \$1)]

**[\$25,000 × .636 (Present value of \$1)]

(b) Project B's present value of \$13,500 is greater than the net present value of Project A of \$11,455.

DIF: Moderate OBJ: 25(10)-03

NAT: AACSB Analytic | IMA-Investment Decisions TOP: Example Exercise 25(10)-5

PROBLEM

1. Buffet Co. is considering a 12-year project that is estimated to cost \$900,000 and has no residual value. Buffet seeks to earn an average rate of return of 17% on all capital projects. Determine the necessary average annual income (using straight-line depreciation) that must be achieved on this project for this project to be acceptable to Buffet Co.

ANS:

$$\frac{\text{Estimated Average Annual Income}}{\text{Average Investment}} = \text{Average Rate of Return}$$

$$\frac{\times}{(\$900,000 + 0)/2} = .17$$

$$\frac{\times}{\$450,000} = .17$$

$$\times = \$76,500$$

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

2. Proposals L and K each cost \$500,000, have 6-year lives, and have expected total cash flows of \$720,000. Proposal L is expected to provide equal annual net cash flows of \$120,000, while the net cash flows for Proposal K are as follows:

Year 1	\$250,000
Year 2	200,000
Year 3	100,000
Year 4	90,000
Year 5	60,000
Year 6	20,000
	<u>\$720,000</u>

Determine the cash payback period for each proposal.

ANS:

Proposal L: \$500,000/\$120,000 = 4.17 years

Proposal K: \$250,000 + \$200,000 + .5 (\$100,000) = \$500,000 = 2.5 years

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

3. Proposals M and N each cost \$600,000, have 6-year lives, and have expected total cash flows of \$750,000. Proposal M is expected to provide equal annual net cash flows of \$125,000, while the net cash flows for Proposal N are as follows:

Year 1	\$250,000
Year 2	\$200,000
Year 3	\$150,000
Year 4	\$ 75,000
Year 5	\$ 50,000
Year 6	\$ 25,000

Determine the cash payback period for each proposal.

ANS:

Proposal M: $\$600,000 / \$125,000 = 4.8$ years

Proposal N: $\$250,000 + \$200,000 + \$150,000 = \$600,000 = 3$ years

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

4. A \$500,000 capital investment proposal has an estimated life of four years and no residual value. The estimated net cash flows are as follows:

<u>Year</u>	<u>Net Cash Flow</u>	<u>Year</u>	<u>Net Cash Flow</u>
1	\$300,000	3	\$208,000
2	260,000	4	180,000

The minimum desired rate of return for net present value analysis is 12%. The present value of \$1 at compound interest of 12% for 1, 2, 3, and 4 years is .893, .797, .712, and .636, respectively.

Determine the net present value.

ANS:

<u>Year</u>	<u>Present Value of \$1 at 12%</u>	<u>Net Cash Flow</u>	<u>Present Value of Net Cash Flow</u>
1	.893	\$300,000	\$267,900
2	.797	260,000	207,220
3	.712	208,000	148,096
4	.636	<u>180,000</u>	<u>114,480</u>
Total		<u>\$948,000</u>	\$737,696
Amount to be invested			<u>500,000</u>
Net present value			<u>\$237,696</u>

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

5. Bonavita Inc. is considering a capital investment proposal that costs \$227,500 and has an estimated life of four years and no residual value. The estimated net cash flows are as follows:

<u>Year</u>	<u>Net Cash Flow</u>
1	\$97,500
2	\$80,000
3	\$60,000
4	\$40,000

The minimum desired rate of return for net present value analysis is 10%. The present value of \$1 at compound interest rates of 10% for 1, 2, 3, and 4 years is .909, .826, .751, and .683, respectively.

Determine the net present value.

ANS:

<u>Year</u>	<u>Present Value of \$1 at 10%</u>	<u>Net Cash Flow</u>	<u>Present Value of Net Cash Flows</u>
1	.909	\$ 97,500	\$ 88,628
2	.826	80,000	66,080
3	.751	60,000	45,060
4	.683	40,000	27,320
Total		<u>\$277,500</u>	<u>\$227,088</u>
Amount to be invested			<u>227,500</u>
Net present value			<u>\$ (412)</u>

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

6. The net present value has been computed for Proposals P and Q. Relevant data are as follows:

	<u>Proposal P</u>	<u>Proposal Q</u>
Amount to be invested	\$265,000	\$445,000
Total present value of net cash flow	286,500	425,000
Net present value	21,500	(20,000)

Determine the present value index for each proposal.

ANS:

Proposal P: $\frac{\$286,500}{\$265,000} = 1.08$

Proposal Q: $\frac{\$425,000}{\$445,000} = .96$

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

7. Williams Company is evaluating a project requiring a capital expenditure of \$480,000. The project has an estimated life of 4 years and no salvage value. The estimated net income and net cash flow from the project are as follows:

<u>Year</u>	<u>Net Income</u>	<u>Net Cash Flow</u>
1	\$ 90,000	\$210,000
2	80,000	200,000
3	40,000	160,000
4	30,000	150,000
	<u>\$240,000</u>	<u>\$720,000</u>

The company's minimum desired rate of return for net present value analysis is 15%. The present value of \$1 at compound interest of 15% for 1, 2, 3, and 4 years is .870, .756, .658, and .572, respectively.

Determine (a) the average rate of return on investment, using straight line depreciation, and (b) the net present value.

ANS:

(a)

$$\frac{\$240,000/4}{(\$480,000 + \$0)/2} = \frac{\$60,000}{\$240,000} = 25\%$$

(b)

<u>Year</u>	<u>Present Value of \$1 at 15%</u>	<u>Net Cash Flow</u>	<u>Present Value of Net Cash Flow</u>
1	.870	\$210,000	\$182,700
2	.756	200,000	151,200
3	.658	160,000	105,280
4	.572	150,000	85,800
Total		<u>\$720,000</u>	<u>\$524,980</u>
Amount to be invested			<u>480,000</u>
Net present value			<u>\$ 44,980</u>

DIF: Difficult OBJ: 25(10)-02
 NAT: AACSB Analytic | IMA-Investment Decisions

8. CAM Co. is evaluating a project requiring a capital expenditure of \$806,250. The project has an estimated life of four years and no salvage value. The estimated net income and net cash flow from the project are as follows:

<u>Year</u>	<u>Net Income</u>	<u>Net Cash Flow</u>
1	\$ 75,000	\$285,000
2	102,000	290,000
3	109,500	190,000
4	36,000	125,000
	<u>\$322,500</u>	<u>\$890,000</u>

The company's minimum desired rate of return is 12%. The present value of \$1 at compound interest of 12% for 1, 2, 3, and 4 years is .893, .797, .712, and .636, respectively.

Determine: (a) the average rate of return on investment, including the effect of depreciation on the investment, and (b) the net present value.

ANS:

(a)

$$\frac{\$322,500/4}{(\$806,250 + 0)/2} = \frac{\$80,625}{\$403,125} = 20\%$$

(b)

<u>Year</u>	<u>Present Value of \$1 at 12%</u>	<u>Net Cash Flow</u>	<u>Present Value of Net Cash Flow</u>
1	.893	\$285,000	\$254,505
2	.797	290,000	231,130
3	.712	190,000	135,280
4	.636	125,000	79,500
Total		<u>\$890,000</u>	<u>\$700,415</u>
Amount to be invested			<u>806,250</u>
Net present value			<u>(105,835)</u>

DIF: Difficult OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

9. The internal rate of return method is used to analyze an \$831,500 capital investment proposal with annual net cash flows of \$250,000 for each of the six years of its useful life.

- (a) Determine a present value factor for an annuity of \$1 which can be used in determining the internal rate of return.
- (b) Based on the factor determined in (a) and the portion of the present value of an annuity of \$1 table presented below, determine the internal rate of return for the proposal.

Year	10%	15%	20%
1	0.909	0.870	0.833
2	1.736	1.626	1.528
3	2.487	2.283	2.106
4	3.170	2.855	2.589
5	3.791	3.353	2.991
6	4.355	3.785	3.326
7	4.868	4.160	3.605

ANS:

(a)

$$\frac{\$831,500}{\$250,000} = 3.326$$

(b)

20%

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

10. Fluffy Co. is considering a 10-year project that is estimated to cost \$700,000 and has no residual value. Fluffy seeks to earn an average rate of return of 15% on all capital projects. Determine the necessary average annual income (using straight-line depreciation) that must be achieved on this project for this project to be acceptable to Fluffy Co.

ANS:

$$\frac{\text{Estimated Average Annual Income}}{\text{Average Investment}} = \text{Average Rate of Return}$$

$$\frac{\times}{(\$700,000 + 0)/2} = .15$$

$$\frac{\times}{\$350,000} = .15$$

$$\times = \$52,500$$

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

11. Proposals A and B each cost \$400,000, have 5-year lives, and have expected total cash flows of \$470,000. Proposal A is expected to provide equal annual net cash flows of \$94,000, while the net cash flows for Proposal B are as follows:

Year 1	\$150,000
Year 2	140,000
Year 3	110,000
Year 4	50,000
Year 5	20,000
	<u>\$470,000</u>

Determine the cash payback period for each proposal.

ANS:

Proposal A: $\$400,000 / \$90,000 = 4.26$ years

Proposal B: $\$150,000 + \$140,000 + \$110,000 = \$400,000 = 3$ years

DIF: Easy OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions

12. A \$400,000 capital investment proposal has an estimated life of four years and no residual value. The estimated net cash flows are as follows:

<u>Year</u>	<u>Net Cash Flow</u>	<u>Year</u>	<u>Net Cash Flow</u>
1	\$200,000	3	\$90,000
2	150,000	4	80,000

The minimum desired rate of return for net present value analysis is 12%. The present value of \$1 at compound interest of 12% for 1, 2, 3, and 4 years is .893, .797, .712, and .636, respectively.

Determine the net present value.

ANS:

<u>Year</u>	<u>Present Value of \$1 at 12%</u>	<u>Net Cash Flow</u>	<u>Present Value of Net Cash Flow</u>
1	.893	\$200,000	\$178,600
2	.797	150,000	119,550
3	.712	90,000	64,080
4	.636	80,000	50,880
Total		<u>\$520,000</u>	\$413,110
Amount to be invested			<u>400,000</u>
Net present value			<u>\$13,110</u>

DIF: Moderate OBJ: 25(10)-02

NAT: AACSB Analytic | IMA-Investment Decisions