Chapter 14—Capital Budgeting

LEARNING OBJECTIVES

LO 1	Why do most capital budgeting methods focus on cash flows?
LO 2	How is payback period computed, and what does it measure?
LO 3	How are the net present value and profitability index of a project measured?
LO 4	How is the internal rate of return on a project computed? What does it measure?
LO 5	How do taxation and depreciation methods affect cash flows?
LO 6	What are the underlying assumptions and limitations of each capital project evaluation method
LO 7	How do managers rank investment projects?
LO 8	How is risk considered in capital budgeting analysis?
LO 9	How and why should management conduct a postinvestment audit of a capital project?
LO 10	(Appendix 1) How are present values calculated?
LO 11	(Appendix 2) What are the advantages and disadvantages of the accounting rate of return method?

QUESTION GRID

True/False

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
1		x		x										
2		x		x										
3	x			x										
4	x			x										
5	x			x										
6	x			x										
7	x				x									
8		x			x									
9		x			x									
10	x					x								
11		x				x								
12		x				x								
13		x					x							
14		x					x							
15		x					x							
16		x					x							
17		x						x						
18		x						x						
19		x						x						
20			x					x						
21		x							x					
22		x							x					
23		x							x					
24		x							x					
25	x									x				
26		x								x				
27	x										x			
28		x									x			
29		x									x			
30	x											x		

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
31	X												x	
32	X												x	
33	X												x	
34		x												x
35		x												x
36		x												x

Completion

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
1	X			x										
2	X			x										
3	X			x										
4	X				x									
5	X				x									
6		x			x									
7	X					x								
8	X					x								
9	X						x							
10		x					x							
11	X								x					
12	X								x					
13		x							x					
14		x							x					
15		x									x			
16	X											x		
17	X													x

Multiple Choice

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
1	X				x									
2	X				x									
3	X				x									
4	X				x									
5	X				x									
6	X				x									
7	X								x					
8	X								x					
9	X				x									
10	X				x									
11	X								x					
12	X				x									
13	X					x								
14	X					x								
15	X			x										
16		x				x								
17	X						x							
18	X				x									
19	X				x									
20	X				x									
21	X					x								
22		x						x						
23	X				x									
24	X								x					
25		x						x						
26	X							x						
27		x						x						
28	X				x									

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
29	X				x									
30		x			x									
31	X				x									
32		x							x					
33		x				x								
34		x				x								
35	X					x								
36	X					x								
37	X					x								
38	X					x								
39	X					x								
40	X					x								
41		x				x								
42	X						x							
43	X								x					
44	X								x					
45	X						x							
46		x						x						
47	X						x							
48	X						x							
49		x						x						
50		x						x						
51	X							x						
52	X							x						
53		x						x						
54	X							x						
55	X							x						
56	X							x						
57	X							x						
58	X								x					
59	X							x						
60		x									x			
61	X								x					
62	X								x					
63		x					x							
64		x						x						
65		x			x									
66		x				x								
67			x					x						
68			x					x						
69			x					x						
70		x						x						
71		x					x							
72		x					x							
73		x						x						
74			x					x						
75		x			x			x						
76		x				x								
77		x					x							
78		x				x								
79		x			x									
80		x			x									
81		x				x								
82		x				x								
83		x					x							
84		x				x								
85		x				x								
86		x					x							
87		x					x							

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
88		x				x								
89		x				x								
90	X												x	
91		x											x	
92	X												x	
93	X												x	
94	X												x	
95	X													x
96	X													x
97		x												x
98		x			x									
99		x											x	
100		x											x	
101		x				x								
102		x				x								
103	X			x										
104	X			x										

Short Answer

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
1		x									x			
2		x						x						
3		x								x				
4		x		x										
5		x							x					
6		x							x					
7		x												x
8		x										x		
9		x									x			
10		x			x									

Problem

	Difficulty Level			Learning Objectives										
	Easy	Mod	Diff	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11
1		x											x	
2		x				x								
3		x			x									
4		x					x							
5		x				x								
6		x				x								
7		x					x							
8		x					x							

TRUE/FALSE

1. Capital budgeting uses financial criteria exclusively when evaluating projects.

   ANS: F DIF: Moderate OBJ: 14-1

2. Capital budgeting uses both financial and non-financial criteria when evaluating projects.

   ANS: T DIF: Moderate OBJ: 14-1

3. Most capital budgeting techniques focus on cash flows.

   ANS: T DIF: Easy OBJ: 14-1

4. Project funding is a financing decision.

   ANS: T DIF: Easy OBJ: 14-1

5. Project funding is an investing decision.

   ANS: F DIF: Easy OBJ: 14-1

6. The decision concerning which assets to acquire to achieve an organization's objectives is an investing decision.

   ANS: T DIF: Easy OBJ: 14-1

7. The payback period ignores the time value of money.

   ANS: T DIF: Easy OBJ: 14-2

8. An organization's discount rate should be less than the organization's cost of capital.

   ANS: F DIF: Moderate OBJ: 14-2

9. An organization's discount rate should be equal to or exceed the organization's cost of capital.

   ANS: T DIF: Moderate OBJ: 14-2

10. If the net present value is positive, the actual return on a project exceeds the required rate of return.

    ANS: T DIF: Easy OBJ: 14-3

11. The net present value method provides the actual rate of return for a project.

    ANS: F DIF: Moderate OBJ: 14-3

12. The profitability index gauges the efficiency of a firm's use of capital.

    ANS: T DIF: Moderate OBJ: 14-3

13. If a project's internal rate of return is greater than or equal to an organization's hurdle rate, the project is considered to be an acceptable investment.

ANS: T DIF: Moderate OBJ: 14-4

14. If a project's internal rate of return is greater than or equal to an organization's hurdle rate, the project is considered to be an unacceptable investment.

ANS: F DIF: Moderate OBJ: 14-4

15. The internal rate of return is the rate at which a project's net present value is zero.

ANS: T DIF: Moderate OBJ: 14-4

16. An organization's hurdle rate should be at least equal to the organization's cost of capital.

ANS: T DIF: Moderate OBJ: 14-4

17. Depreciation expense provides a tax shield against the payment of taxes.

ANS: T DIF: Easy OBJ: 14-5

18. The tax benefit from depreciation expense is the depreciation amount multiplied by the tax rate.

ANS: T DIF: Moderate OBJ: 14-5

19. The tax benefit from depreciation expense is the depreciation amount divided by the tax rate.

ANS: F DIF: Moderate OBJ: 14-5

20. Using MACRS depreciation for tax purposes and straight-line depreciation for book purposes will affect after-tax cash flows during the life of a project.

ANS: T DIF: Difficult OBJ: 14-5

21. A decision in which projects are ranked according to their impact on achieving company objectives is a screening decision.

ANS: F DIF: Moderate OBJ: 14-6

22. A decision in which projects are ranked according to their impact on achieving company objectives is a preference decision.

ANS: T DIF: Moderate OBJ: 14-6

23. In a mutually inclusive project situation, if one project is chosen, all related projects are also chosen.

ANS: T DIF: Moderate OBJ: 14-6

24. In a mutually inclusive project situation, if one project is chosen, all related projects are eliminated from further consideration.

ANS: F DIF: Moderate OBJ: 14-6

25. Managers must often use multiple measures to effectively rank capital projects.

ANS: T DIF: Easy OBJ: 14-7

26. Reinvestment assumptions are different under each method of ranking capital projects.

ANS: T DIF: Moderate OBJ: 14-7

27. When considering risk, a manager will often use a judgmental method of risk adjustment.

ANS: T DIF: Easy OBJ: 14-8

28. When using the risk-adjusted discount rate method, a manager increases the rate used for discounting future cash inflows.

ANS: T DIF: Moderate OBJ: 14-8

29. When using the risk-adjusted discount rate method, a manager increases the rate used for discounting future cash outflows.

ANS: F DIF: Moderate OBJ: 14-8

30. Postinvestment audits can provide feedback of the accuracy of original cash flow estimates.

ANS: T DIF: Easy OBJ: 14-9

31. Present value and future value computations assume the use of compound interest.

ANS: T DIF: Easy OBJ: 14-10

32. For an ordinary annuity, the first cash flow occurs at the end of the period.

ANS: T DIF: Easy OBJ: 14-10

33. For an annuity due, the first cash flow occurs at the end of the period.

ANS: F DIF: Easy OBJ: 14-10

34. The accounting rate of return considers the salvage value of an asset.

ANS: T DIF: Moderate OBJ: 14-11

35. The accounting rate of return considers the time value of money.

ANS: F DIF: Moderate OBJ: 14-11

36. Accounting rate of return is based on cash flows.

ANS: F DIF: Moderate OBJ: 14-11

COMPLETION

1. The evaluation of future long-range projects to allocate resources effectively and efficiently is referred to as _____.

   ANS: capital budgeting

   DIF: Easy OBJ: 14-1

2. A judgment regarding an entity's method of funding an investment is considered to be a(n) _____ decision.

   ANS: financing

   DIF: Easy OBJ: 14-1

3. A judgment regarding which assets an entity should acquire to achieve its stated objectives is considered to be a(n) _____ decision.

   ANS: investing

   DIF: Easy OBJ: 14-1

4. A capital budgeting method that measures the time required for a project's cash inflows to equal the original investment is referred to as the _____.

   ANS: payback period

   DIF: Easy OBJ: 14-2

5. The rate of return required by a company that is used to determine the imputed interest portion of future cash receipts and disbursements is referred to as the _____.

   ANS: discount rate

   DIF: Easy OBJ: 14-2

6. The weighted average cost of an organization's various sources of funds is referred to as _____.

   ANS: cost of capital

   DIF: Moderate OBJ: 14-2

7. A capital budgeting technique that compares a project's rate of return with the desired rate of return for an organization is known as the _____ method.

   ANS: net present value

   DIF: Easy OBJ: 14-3

8. A ratio comparing the present value of a project's net cash inflows to the project's net investment is referred to as the _____.

   ANS: profitability index

   DIF: Easy OBJ: 14-3

9. The discount rate that causes the present value of a project's net cash inflows to equal the present value of the cash outflows is referred to as the _____.

   ANS: internal rate of return

   DIF: Easy OBJ: 14-4

10. The rate of return specified as the lowest acceptable return on an investment is referred to as the _____.

    ANS: hurdle rate

    DIF: Moderate OBJ: 14-4

11. A decision regarding whether a capital project is desirable based upon some previously established minimum criteria is referred to as a(n) _____.

    ANS: screening decision

    DIF: Easy OBJ: 14-6

12. A decision in which projects are ranked according to their impact on the achievement of company objectives is referred to as a(n) _____.

    ANS: preference decision

    DIF: Easy OBJ: 14-6

13. When a project is chosen from a group and all other projects are excluded from further consideration, the project is referred to as _____.

    ANS: mutually exclusive.

    DIF: Moderate OBJ: 14-6

14. In a _____ project situation, if one project is chosen, all related projects are also chosen.

    ANS: mutually inclusive

    DIF: Moderate OBJ: 14-6

15. The process of determining the amount of change that must occur in a variable before a different decision would be made is referred to as _____.

    ANS: sensitivity analysis

DIF: Moderate OBJ: 14-8

16. When information on actual project results is gathered and compared to actual results, the process is referred to as a(n) _____.

ANS: postinvestment audit

DIF: Easy OBJ: 14-9

17. The capital budgeting technique that divides average annual profits from an investment by the average investment in a project is referred to as the _____.

ANS: accounting rate of return

DIF: Easy OBJ: 14-11

MULTIPLE CHOICE

1. Which of the following capital budgeting techniques **ignores** the time value of money?
   a. payback period
   b. net present value
   c. internal rate of return
   d. profitability index

ANS: A DIF: Easy OBJ: 14-2

2. Which of the following capital budgeting techniques may potentially ignore part of a project's relevant cash flows?
   a. net present value
   b. internal rate of return
   c. payback period
   d. profitability index

ANS: C DIF: Easy OBJ: 14-2

3. In comparing two projects, the _____ is often used to evaluate the relative riskiness of the projects.
   a. payback period
   b. net present value
   c. internal rate of return
   d. discount rate

ANS: A DIF: Easy OBJ: 14-2

4. Which of the following capital budgeting techniques does **not** routinely rely on the assumption that all cash flows occur at the end of the period?
   a. internal rate of return
   b. net present value
   c. profitability index
   d. payback period

ANS: D DIF: Easy OBJ: 14-2

5. Assume that a project consists of an initial cash outlay of $100,000 followed by equal annual cash inflows of $40,000 for 4 years. In the formula X = $100,000/$40,000, X represents the
   a. payback period for the project.
   b. profitability index of the project.
   c. internal rate of return for the project.
   d. project's discount rate.

   ANS: A DIF: Easy OBJ: 14-2

6. All other factors equal, a large number is preferred to a smaller number for all capital project evaluation measures **except**
   a. net present value.
   b. payback period.
   c. internal rate of return.
   d. profitability index.

   ANS: B DIF: Easy OBJ: 14-2

7. The payback method assumes that all cash inflows are reinvested to yield a return equal to
   a. the discount rate.
   b. the hurdle rate.
   c. the internal rate of return.
   d. zero.

   ANS: D DIF: Easy OBJ: 14-6

8. The payback method measures
   a. how quickly investment dollars may be recovered.
   b. the cash flow from an investment.
   c. the economic life of an investment.
   d. the profitability of an investment.

   ANS: A DIF: Easy OBJ: 14-6

9. If investment A has a payback period of three years and investment B has a payback period of four years, then
   a. A is more profitable than B.
   b. A is less profitable than B.
   c. A and B are equally profitable.
   d. the relative profitability of A and B cannot be determined from the information given.

   ANS: D DIF: Easy OBJ: 14-2

10. The payback period is the
    a. length of time over which the investment will provide cash inflows.
    b. length of time over which the initial investment is recovered.
    c. shortest length of time over which an investment may be depreciated.
    d. shortest length of time over which the net present value will be positive.

    ANS: B DIF: Easy OBJ: 14-2

11. Which of the following capital budgeting techniques has been criticized because it fails to consider investment profitability?
    a. payback method
    b. accounting rate of return
    c. net present value method
    d. internal rate of return

    ANS: A DIF: Easy OBJ: 14-6

12. The time value of money is explicitly recognized through the process of
    a. interpolating.
    b. discounting.
    c. annuitizing.
    d. budgeting.

    ANS: B DIF: Easy OBJ: 14-2

13. The time value of money is considered in long-range investment decisions by
    a. assuming equal annual cash flow patterns.
    b. investing only in short-term projects.
    c. assigning greater value to more immediate cash flows.
    d. ignoring depreciation and tax implications of the investment.

    ANS: C DIF: Easy OBJ: 14-3

14. When using one of the discounted cash flow methods to evaluate the desirability of a capital budgeting project, which of the following factors is generally **not** important?
    a. method of financing the project under consideration
    b. timing of cash flows relating to the project
    c. impact of the project on income taxes to be paid
    d. amounts of cash flows relating to the project

    ANS: A DIF: Easy OBJ: 14-3

15. With regard to a capital investment, net cash inflow is equal to the
    a. cost savings resulting from the investment.
    b. sum of all future revenues from the investment.
    c. net increase in cash receipts over cash payments.
    d. net increase in cash payments over cash receipts.

    ANS: C DIF: Easy OBJ: 14-1

16. In a discounted cash flow analysis, which of the following would **not** be consistent with adjusting a project's cash flows to account for higher-than-normal risk?
    a. increasing the expected amount for cash outflows
    b. increasing the discounting period for expected cash inflows
    c. increasing the discount rate for cash outflows
    d. decreasing the amount for expected cash inflows

    ANS: C DIF: Moderate OBJ: 14-3

17. When a project has uneven projected cash inflows over its life, an analyst may be forced to use _____ to find the project's internal rate of return.
    a. a screening decision
    b. a trial-and-error approach
    c. a post investment audit
    d. a time line

    ANS: B DIF: Easy OBJ: 14-4

18. The interest rate used to find the present value of a future cash flow is the
    a. prime rate.
    b. discount rate.
    c. cutoff rate.
    d. internal rate of return.

    ANS: B DIF: Easy OBJ: 14-2

19. A firm's discount rate is typically based on
    a. the interest rates related to the firm's bonds.
    b. a project's internal rate of return.
    c. its cost of capital.
    d. the corporate Aa bond yield.

    ANS: C DIF: Easy OBJ: 14-2

20. In capital budgeting, a firm's cost of capital is frequently used as the
    a. internal rate of return.
    b. accounting rate of return.
    c. discount rate.
    d. profitability index.

    ANS: C DIF: Easy OBJ: 14-2

21. The net present value method assumes that all cash inflows can be immediately reinvested at the
    a. cost of capital.
    b. discount rate.
    c. internal rate of return.
    d. rate on the corporation's short-term debt.

    ANS: B DIF: Easy OBJ: 14-3

22. Which of the following changes would **not** decrease the present value of the future depreciation deductions on a specific depreciable asset?
    a. a decrease in the marginal tax rate
    b. a decrease in the discount rate
    c. a decrease in the rate of depreciation
    d. an increase in the life expectancy of the depreciable asset

    ANS: B DIF: Moderate OBJ: 14-5

23. To reflect greater uncertainty (greater risk) about a future cash inflow, an analyst could
    a. increase the discount rate for the cash flow.
    b. decrease the discounting period for the cash flow.
    c. increase the expected value of the future cash flow before it is discounted.
    d. extend the acceptable length for the payback period.

    ANS: A DIF: Easy OBJ: 14-2

24. A change in the discount rate used to evaluate a specific project will affect the project's
    a. life.
    b. payback period.
    c. net present value.
    d. total cash flows.

    ANS: C DIF: Easy OBJ: 14-6

25. For a project such as plant investment, the return that should leave the market price of the firm's stock unchanged is known as the
    a. cost of capital.
    b. net present value.
    c. payback rate.
    d. internal rate of return.

    ANS: A DIF: Moderate OBJ: 14-5

26. The pre-tax cost of capital is higher than the after-tax cost of capital because
    a. interest expense is deductible for tax purposes.
    b. principal payments on debt are deductible for tax purposes.
    c. the cost of capital is a deductible expense for tax purposes.
    d. dividend payments to stockholders are deductible for tax purposes.

    ANS: A DIF: Easy OBJ: 14-5

27. The basis for measuring the cost of capital derived from bonds and preferred stock, respectively, is the
    a. pre-tax rate of interest for bonds and stated annual dividend rate less the expected earnings per share for preferred stock.
    b. pre-tax rate of interest for bonds and stated annual dividend rate for preferred stock.
    c. after-tax rate of interest for bonds and stated annual dividend rate less the expected earnings per share for preferred stock.
    d. after-tax rate of interest for bonds and stated annual dividend rate for preferred stock.

    ANS: D DIF: Moderate OBJ: 14-5

28. The combined weighted average interest rate that a firm incurs on its long-term debt, preferred stock, and common stock is the
    a. cost of capital.
    b. discount rate.
    c. cutoff rate.
    d. internal rate of return.

    ANS: A DIF: Easy OBJ: 14-2

29. The weighted average cost of capital that is used to evaluate a specific project should be based on the
    a. mix of capital components that was used to finance a project from last year.
    b. overall capital structure of the corporation.
    c. cost of capital for other corporations with similar investments.
    d. mix of capital components for all capital acquired in the most recent fiscal year.

    ANS: B DIF: Easy OBJ: 14-2

30. Debt in the capital structure could be treated as if it were common equity in computing the weighted average cost of capital if the debt were
    a. callable.
    b. participating.
    c. cumulative.
    d. convertible.

    ANS: D DIF: Moderate OBJ: 14-2

31. The weighted average cost of capital approach to decision making is **not** directly affected by the
    a. value of the common stock.
    b. current budget for capital expansion.
    c. cost of debt outstanding.
    d. proposed mix of debt, equity, and existing funds used to implement the project.

    ANS: B DIF: Easy OBJ: 14-2

32. The _____ is the highest rate of return that can be earned from the most attractive, alternative capital project available to the firm.
    a. accounting rate of return
    b. internal rate of return
    c. hurdle rate
    d. opportunity cost of capital

    ANS: D DIF: Moderate OBJ: 14-6

33. If an analyst desires a conservative net present value estimate, he/she will assume that all cash inflows occur at
    a. mid year.
    b. the beginning of the year.
    c. year end.
    d. irregular intervals.

    ANS: C DIF: Easy OBJ: 14-3

34. The salvage value of an old lathe is zero. If instead, the salvage value of the old lathe was $20,000, what would be the impact on the net present value of the proposal to purchase a new lathe?
    a. It would increase the net present value of the proposal.
    b. It would decrease the net present value of the proposal.
    c. It would not affect the net present value of the proposal.
    d. Potentially it could increase or decrease the net present value of the new lathe.

    ANS: A DIF: Easy OBJ: 14-3

35. The net present value method of evaluating proposed investments
    a. measures a project's internal rate of return.
    b. ignores cash flows beyond the payback period.
    c. applies only to mutually exclusive investment proposals.
    d. discounts cash flows at a minimum desired rate of return.

    ANS: D DIF: Easy OBJ: 14-3

36. Which of the following statements is **true** regarding capital budgeting methods?
    a. The Fisher rate can never exceed a company's cost of capital.
    b. The internal rate of return measure used for capital project evaluation has more conservative assumptions than the net present value method, especially for projects that generate a positive net present value.
    c. The net present value method of project evaluation will always provide the same ranking of projects as the profitability index method.
    d. The net present value method assumes that all cash inflows can be reinvested at the project's cost of capital.

    ANS: D DIF: Easy OBJ: 14-3

37. If a project generates a net present value of zero, the profitability index for the project will
    a. equal zero.
    b. equal 1.
    c. equal -1.
    d. be undefined.

    ANS: B DIF: Easy OBJ: 14-3

38. If the profitability index for a project exceeds 1, then the project's
    a. net present value is positive.
    b. internal rate of return is less than the project's discount rate.
    c. payback period is less than 5 years.
    d. accounting rate of return is greater than the project's internal rate of return.

    ANS: A DIF: Easy OBJ: 14-3

39. If a project's profitability index is less than 1, the project's
    a. discount rate is above its cost of capital.
    b. internal rate of return is less than zero.
    c. payback period is infinite.
    d. net present value is negative.

    ANS: D DIF: Easy OBJ: 14-3

40. The profitability index is
    a. the ratio of net cash flows to the original investment.
    b. the ratio of the present value of cash flows to the original investment.
    c. a capital budgeting evaluation technique that doesn't use discounted values.
    d. a mandatory technique when capital rationing is used.

    ANS: B DIF: Easy OBJ: 14-3

41. Which method of evaluating capital projects assumes that cash inflows can be reinvested at the discount rate?
    a. internal rate of return
    b. payback period
    c. profitability index
    d. accounting rate of return

    ANS: C DIF: Moderate OBJ: 14-3

42. If the total cash inflows associated with a project exceed the total cash outflows associated with the project, the project's
    a. net present value is greater than zero.
    b. internal rate of return is greater than zero.
    c. profitability index is greater than 1.
    d. payback period is acceptable.

    ANS: B DIF: Easy OBJ: 14-4

43. The net present value and internal rate of return methods of decision making in capital budgeting are superior to the payback method in that they
    a. are easier to implement.
    b. consider the time value of money.
    c. require less input.
    d. reflect the effects of sensitivity analysis.

    ANS: B DIF: Easy OBJ: 14-6

44. If an investment has a positive net present value, the
    a. internal rate of return is higher than the discount rate.
    b. discount rate is higher than the hurdle rate of return.
    c. internal rate of return is lower than the discount rate of return.
    d. hurdle rate of return is higher than the discount rate.

    ANS: A DIF: Easy OBJ: 14-6

45. The rate of interest that produces a zero net present value when a project's discounted cash operating advantage is netted against its discounted net investment is the
    a. cost of capital.
    b. discount rate.
    c. cutoff rate.
    d. internal rate of return.

    ANS: D DIF: Easy OBJ: 14-4

46. For a profitable company, an increase in the rate of depreciation on a specific project could
    a. increase the project's profitability index.
    b. increase the project's payback period.
    c. decrease the project's net present value.
    d. increase the project's internal rate of return.

    ANS: D DIF: Moderate OBJ: 14-5

47. Which of the following capital expenditure planning and control techniques has been criticized because it might mistakenly imply that earnings are reinvested at the rate of return earned by the investment?
    a. payback method
    b. accounting rate of return
    c. net present value method
    d. internal rate of return

    ANS: D DIF: Easy OBJ: 14-4

48. If the discount rate that is used to evaluate a project is equal to the project's internal rate of return, the project's _____ is zero.
    a. profitability index
    b. internal rate of return
    c. present value of the investment
    d. net present value

    ANS: D DIF: Easy OBJ: 14-4

49. As the marginal tax rate goes up, the benefit from the depreciation tax shield
    a. decreases.
    b. increases.
    c. stays the same.
    d. can move up or down depending on whether the firm's cost of capital is high or low.

    ANS: B DIF: Moderate OBJ: 14-5

50. When a profitable corporation sells an asset at a loss, the after-tax cash flow on the sale will
    a. exceed the pre-tax cash flow on the sale.
    b. be less than the pre-tax cash flow on the sale.
    c. be the same as the pre-tax cash flow on the sale.
    d. increase the corporation's overall tax liability.

    ANS: A DIF: Moderate OBJ: 14-5

51. In a typical (conservative assumptions) after-tax discounted cash flow analysis, depreciation expense is assumed to accrue at
    a. the beginning of the period.
    b. the middle of the period.
    c. the end of the period.
    d. irregular intervals over the life of the investment.

    ANS: C DIF: Easy OBJ: 14-5

52. The pre-tax and after-tax cash flows would be the same for all of the following items **except**
    a. the liquidation of working capital at the end of a project's life.
    b. the initial (outlay) cost of an investment.
    c. the sale of an asset at its book value.
    d. a cash payment for salaries and wages.

    ANS: D DIF: Easy OBJ: 14-5

53. The after-tax net present value of a project is affected by
    a. tax-deductible cash flows.
    b. non-tax-deductible cash flows.
    c. accounting accruals.
    d. all of the above.

    ANS: D DIF: Moderate OBJ: 14-5

54. A project's after-tax net present value is increased by all of the following **except**
    a. revenue accruals.
    b. cash inflows.
    c. depreciation deductions.
    d. expense accruals.

    ANS: A DIF: Easy OBJ: 14-5

55. Multiplying the depreciation deduction by the tax rate yields a measure of the depreciation tax
    a. shield.
    b. benefit.
    c. payable.
    d. loss.

    ANS: B DIF: Easy OBJ: 14-5

56. Annual after-tax corporate net income can be converted to annual after-tax cash flow by
    a. adding back the depreciation amount.
    b. deducting the depreciation amount.
    c. adding back the quantity ($t \times$ depreciation deduction), where t is the corporate tax rate.
    d. deducting the quantity [$(1- t) \times$ depreciation deduction], where t is the corporate tax rate.

    ANS: A DIF: Easy OBJ: 14-5

57. Income taxes are levied on
    a. net cash flow.
    b. income as measured by accounting rules.
    c. net cash flow plus depreciation.
    d. income as measured by tax rules.

    ANS: D DIF: Easy OBJ: 14-5

58. Which of the following best represents a screening decision?
    a. determining which project has the highest net present value
    b. determining if a project's internal rate of return exceeds the firm's cost of capital
    c. determining which projects are mutually exclusive
    d. determining which are the best projects

    ANS: B DIF: Easy OBJ: 14-6

59. Which of the following are tax deductible under U.S. tax law?
    a. interest payments to bondholders
    b. preferred stock dividends
    c. common stock dividends
    d. all of the above

    ANS: A DIF: Easy OBJ: 14-5

60. Sensitivity analysis is
    a. an appropriate response to uncertainty in cash flow projections.
    b. useful in measuring the variance of the Fisher rate.
    c. typically conducted in the post investment audit.
    d. useful to compare projects requiring vastly different levels of initial investment.

    ANS: A DIF: Moderate OBJ: 14-8

61. If management judges one project in a mutually inclusive set to be acceptable for investment,
    a. all the other projects in the set are rejected.
    b. only one other project in the set can be accepted.
    c. all other projects in the set are also accepted.
    d. only one project in the set will be rejected.

    ANS: C DIF: Easy OBJ: 14-6

62. All other factors equal, which of the following would affect a project's internal rate of return, net present value, and payback period?
    a. an increase in the discount rate
    b. a decrease in the life of the project
    c. an increase in the initial cost of the project
    d. all of the above

    ANS: C DIF: Easy OBJ: 14-6

63. Hopwood Corporation bought a piece of machinery. Selected data is presented below:

Useful life	6 years
Yearly net cash inflow	$45,000
Salvage value	- 0 -
Internal rate of return	18%
Cost of capital	14%

    Present value tables or a financial calculator are required.

    The initial cost of the machinery was
    a. $157,392.
    b. $174,992.
    c. $165,812.
    d. impossible to determine from the information given.

    ANS: A

Use PV of Annuity for 6 years and 18% $45,000 * 3.4976 = $157,392

    DIF: Moderate OBJ: 14-4

64. Datasoft Industries is considering the purchase of a $100,000 machine that is expected to result in a decrease of $15,000 per year in cash expenses. This machine, which has no residual value, has an estimated useful life of 10 years and will be depreciated on a straight-line basis. For this machine, the accounting rate of return would be
    a. 10 percent.
    b. 15 percent.
    c. 30 percent.
    d. 35 percent.

    ANS: C
    $15,000/($100,000/2) = 30%

    DIF: Moderate OBJ: 14-5

65. An investment project is expected to yield $10,000 in annual revenues, has $2,000 in fixed costs per year, and requires an initial investment of $5,000. Given a cost of goods sold of 60 percent of sales, what is the payback period in years?
    a. 2.50
    b. 5.00
    c. 2.00
    d. 1.25

    ANS: A

    Net cash flow = $10,000 - $6,000 - $2,000
    Net cash flow = $2,000
    $5,000/$2,000 = 2.50 years

    DIF: Moderate OBJ: 14-2

66. A project has an initial cost of $100,000 and generates a present value of net cash inflows of $120,000. What is the project's profitability index?
    a. .20
    b. 1.20
    c. .80
    d. 5.00

    ANS: B
    Profitability Index = $120,000/$100,000 = 1.20

    DIF: Moderate OBJ: 14-3

67. Clement Corporation. faces a marginal tax rate of 35 percent. One project that is currently under evaluation has a cash flow in the fourth year of its life that has a present value of $10,000 (after-tax). Clement Corporation. assumes that all cash flows occur at the end of the year and the company uses 11 percent as its discount rate. What is the pre-tax amount of the cash flow in year 4? (Round to the nearest dollar.) **Present value tables or a financial calculator are required.**

a. $15,181
b. $23,356
c. $9,868
d. $43,375

ANS: B

$10,000 /0.65 = $15,384.61
Use PV Table for 4 years, 11%. Constant = 0.6587
$15384.61 / 0.6587 = $23,356.

DIF: Difficult OBJ: 14-5

Seaworthy Corporation

Seaworthy Corporation is considering the purchase of a new ocean-going vessel that could potentially reduce labor costs of its operation by a considerable margin. The new ship would cost $500,000 and would be fully depreciated by the straight-line method over 10 years. At the end of 10 years, the ship will have no value and will be scuttled. Seaworthy Company's cost of capital is 12 percent, and its marginal tax rate is 40 percent.

68. Refer to Seaworthy Corporation. What is the present value of the depreciation tax benefit of the new ship? (Round to the nearest dollar.) **Present value tables or a financial calculator are required.**
a. $113,004
b. $282,510
c. $169,506
d. $200,000

ANS: A

Annual depreciation = $50,000
Tax savings = $20,000
Use PV of Annuity table 10 years, 12%; Constant = 5.6502
$20,000 * 5.6502 = $113,004

DIF: Difficult OBJ: 14-5

69. Refer to Seaworthy Corporation. If the ship produces equal annual labor cost savings over its 10-year life, how much do the annual savings in labor costs need to be to generate a net present value of $0 on the project? (Round to the nearest dollar.) **Present value tables or a financial calculator are required.**

a. $68,492
b. $114,154
c. $88,492
d. $147,487

ANS: C

NPV of Labor Savings = $500,000 Use PV of Annuity Table 10 years, 12%; Constant = 5.6502 $500,000 / 5.6502 = $88,492

DIF: Difficult OBJ: 14-5

70. Stone Corporation recently sold a used machine for $40,000. The machine had a book value of $60,000 at the time of the sale. What is the after-tax cash flow from the sale, assuming the company's marginal tax rate is 20 percent?

a. $40,000
b. $60,000
c. $44,000
d. $32,000

ANS: C

Loss of $20,000 generates a tax savings of $4,000 ($20,000 * 20%) Proceeds + Tax Savings = After-tax cash flow $40,000 + $4,000 = $44,000

DIF: Moderate OBJ: 14-5

Fleming Company

Fleming Company is considering an investment in a machine that would reduce annual labor costs by $30,000. The machine has an expected life of 10 years with no salvage value. The machine would be depreciated according to the straight-line method over its useful life. The company's marginal tax rate is 30 percent.

71. Refer to Fleming Company. Assume that the company will invest in the machine if it generates an internal rate of return of 16 percent. What is the maximum amount the company can pay for the machine and still meet the internal rate of return criterion? **Present value tables or a financial calculator are required.**

a. $180,000
b. $210,000
c. $187,500
d. $144,996

ANS: D

Use PV of Annuity Table; 10 years, 16%; Constant = 4.8330
$30,000 * 4.8330 = $144,496

DIF: Moderate OBJ: 14-4

72. Refer to Fleming Company. Assume the company pays $250,000 for the machine. What is the expected internal rate of return on the machine? **Present value tables or a financial calculator are required.**

a. between 8 and 9 percent
b. between 3 and 4 percent
c. between 17 and 18 percent
d. less than 1 percent

ANS: B

$250,000/$30,000 = $8.33\overline{3}$
Using PV of Annuity Table and 10 years, this constant falls between 3% and 4%

DIF: Moderate OBJ: 14-4

73. A project under consideration by Close Corporation would require a working capital investment of $200,000. The working capital would be liquidated at the end of the project's 10-year life. If Close Corporation has an after-tax cost of capital of 10 percent and a marginal tax rate of 30 percent, what is the present value of the working capital cash flow expected to be received in year 10? **Present value tables or a financial calculator are required.**

a. $36,868
b. $77,100
c. $53,970
d. $23,130

ANS: B

The return of capital is tax-free.
Use PV of $1 10 years, 10%; Constant = 0.3855
$200,000 * 0.3855 = $77,100

DIF: Moderate OBJ: 14-5

74. Biggs Industries is considering two alternative ways to depreciate a proposed investment. The investment has an initial cost of $100,000 and an expected five-year life. The two alternative depreciation schedules follow:

	Method 1	Method 2
Year 1 depreciation	$20,000	$40,000
Year 2 depreciation	$20,000	$30,000
Year 3 depreciation	$20,000	$20,000
Year 4 depreciation	$20,000	$10,000
Year 5 depreciation	$20,000	$0

Assuming that the company faces a marginal tax rate of 40 percent and has a cost of capital of 10 percent, what is the difference between the two methods in the present value of the depreciation tax benefit? **Present value tables or a financial calculator are required.**

a. $7,196
b. $0
c. $2,878
d. $6,342

ANS: C

Year	Difference in Depreciation	After-Tax Difference	PV of $1 Table Value	Discounted Value
1	$ 20,000	$ 8,000	0.9091	$ 7,272
2	$ 10,000	$ 4,000	0.8265	$ 3,306
3	$ -0-	$ 0-	0.7513	$ -0-
4	$(10,000)	$(4,000)	0.6830	$(2,732)
5	$(20,000)	$(8,000)	0.6209	$(4,967)
			Total	$ 2,878

DIF: Difficult OBJ: 14-5

Seabreeze Creations

Seabreeze Creations is considering an investment in a computer that is capable of producing various images that are useful in the production of commercial art. The computer would cost $20,000 and have an expected life of eight years. The computer is expected to generate additional annual net cash receipts (before-tax) of $6,000 per year. The computer will be depreciated according to the straight-line method and the firm's marginal tax rate is 25 percent.

75. Refer to Seabreeze Creations. What is the after-tax payback period for the computer project?
    a. 7.62 years
    b. 3.90 years
    c. 4.44 years
    d. 3.11 years

    ANS: B

Payback Period = Investment/After-Tax Cash Flows After Tax Cash Flows = [(6,000 *0.75) + (2,500 *0.25)] = $5,125 Payback Period = $20,000/$5,125 = 3.90 years

    DIF: Moderate OBJ: 14-2,14-5

76. Refer to Seabreeze Creations. What is the after-tax net present value of the proposed project (using a 16 percent discount rate)? **Present value tables or a financial calculator are required.**
    a. $2,261
    b. $(454)
    c. $6,062
    d. $(4,797)

    ANS: A

Use PV of Annuity Table 16%, 8 years; Constant = 4.3436 After-tax inflows =$5,125 * 4.3436 = $ 22,261 $22,261 - $20,000 = $2,261

    DIF: Moderate OBJ: 14-3

    Webber Corporation

    Webber Corporation is considering an investment in a labor-saving machine. Information on this machine follows:

Cost	$30,000
Salvage value in five years	$0
Estimated life	5 years
Annual depreciation	$6,000
Annual reduction in existing costs	$8,000

77. Refer to Webber Corporation. What is the internal rate of return on this project (round to the nearest 1/2%)? **Present value tables or a financial calculator are required.**
    a. 37.5%
    b. 25.0%
    c. 10.5%
    d. 13.5%

    ANS: C

IRR = $30,000 / $8,000 = 3.75 Using PV of Annuity Table 5 years. The constant of 3.75 corresponds to a rate of 10.5%

    DIF: Moderate OBJ: 14-4

78. Refer to Hefty Investment. Assume for this question only that Hefty Co. uses a discount rate of 16 percent to evaluate projects of this type. What is the project's net present value? **Present value tables or a financial calculator are required.**
    a. $(6,283)
    b. $(3,806)
    c. $(23,451)
    d. $(22,000)

    ANS: B

Use PV of Annuity Table 16%, 5 years. Corresponding constant is 3.2743	
Annual reduction in costs $8,000 * 3.2743	$ 26,194
Investment	(30,000)
Net Present Value	(3,806)
	=======

    DIF: Moderate OBJ: 14-3

79. Refer to Hefty Investment. What is the payback period on this investment?
    a. 4 years
    b. 2.14 years
    c. 3.75 years
    d. 5 years

    ANS: C

Payback Period = Initial Investment/Cash Savings
= $30,000/$8,000
= 3.75 years

    DIF: Moderate OBJ: 14-2

Ruston Ironworks

Ruston Ironworks is considering a proposal to sell an existing lathe and purchase a new computer-operated lathe. Information on the existing lathe and the computer-operated lathe follow:

	Existing lathe	Computer-operated lathe
Cost	$100,000	$300,000
Accumulated depreciation	60,000	0
Salvage value now	20,000	
Salvage value in 4 years	0	60,000
Annual depreciation	10,000	75,000
Annual cash operating costs	200,000	50,000
Remaining useful life	4 years	4 years

80. Refer to Ruston Ironworks. What is the payback period for the computer-operated lathe?
    a. 1.87 years
    b. 2.00 years
    c. 3.53 years
    d. 3.29 years

    ANS: A

Payback Period = [(New Lathe Cost - Old Lathe Salvage)/Cost Savings from New Lathe] Payback Period = [(300,000 - 20,000)/150,000] = 1.87 years

    DIF: Moderate OBJ: 14-2

81. Refer to Ruston Ironworks. If the company uses 10 percent as its discount rate, what is the net present value of the proposed new lathe purchase? **Present value tables or a financial calculator are required.**
    a. $236,465
    b. $256,465
    c. $195,485
    d. $30,422

    ANS: A

	Amount	PV Table Constant	Present Value
Annual Cost Savings	$ 150,000	3.1699	$ 475,485
Salvage Value	60,000	0.6830	40,980
Initial Investment	(280,000)	1.0000	(280,000)
Net Present Value			$ 236,465

    DIF: Moderate OBJ: 14-3

Wortham Corporation

The Wortham Corporation has recently evaluated a proposal to invest in cost-reducing production technology. According to the evaluation, the project would require an initial investment of $17,166 and would provide equal annual cost savings for five years. Based on a 10 percent discount rate, the project generates a net present value of $1,788. The project is not expected to have any salvage value at the end of its five-year life.

82. Refer to Wortham Corporation. What are the expected annual cost savings of the project? **Present value tables or a financial calculator are required.**
a. $3,500
b. $4,000
c. $4,500
d. $5,000

ANS: D

Net Present Value = $ 1,788 Initial Investment = 17,166 PV of Cash Inflows = 18,954 Use PV of Annuity Table (5 years, 10% discount); Constant = 3.7908 $18,954 / 3.7908 = $5,000

DIF: Moderate OBJ: 14-3

83. Refer to Wortham Corporation. What is the project's expected internal rate of return? **Present value tables or a financial calculator are required.**
a. 10%
b. 11%
c. 13%
d. 14%

ANS: D

IRR = 17,166/5,000 = 3.4332 Use PV of Annuity table 5 years Constant corresponds to an IRR of 14%

DIF: Moderate OBJ: 14-4

Rhodes Corporation

Rhodes Corporation is involved in the evaluation of a new computer-integrated manufacturing system. The system has a projected initial cost of $1,000,000. It has an expected life of six years, with no salvage value, and is expected to generate annual cost savings of $250,000. Based on Rhodes Corporation's analysis, the project has a net present value of $57,625.

84. Refer to Rhodes Corporation. What discount rate did the company use to compute the net present value? **Present value tables or a financial calculator are required.**
a. 10%
b. 11%
c. 12%
d. 13%

ANS: B

NPV = $ 57,625 Initial Cost = $1,000,000 PV of Cash Inflows = $1,057,625 Annual Cost Savings =$ 250,000 $1,057,625/$250,000 = 4.2305 PV of Annuity Constant At 6 years, the constant corresponds to a discount rate of 11%.

DIF: Moderate OBJ: 14-3

85. Refer to Rhodes Corporation. What is the project's profitability index?
    a. 1.058
    b. .058
    c. .945
    d. 1.000

    ANS: A
    PI = $1,057,625/1,000,000 = 1.058

    DIF: Moderate OBJ: 14-3

86. Refer to Rhodes Corporation. What is the project's internal rate of return? **Present value tables or a financial calculator are required.**
    a. between 12.5 and 13.0 percent
    b. between 11.0 and 11.5 percent
    c. between 11.5 and 12.0 percent
    d. between 13.0 and 13.5 percent

    ANS: A
    $1,000,000/$250,000 = 4.000
    Using the Present Value of Annuity Table for 6 years, the rate falls between 12.5% and 13%

    DIF: Moderate OBJ: 14-4

87. Carol Jones recently invested in a project that promised an internal rate of return of 15 percent. If the project has an expected annual cash inflow of $12,000 for six years, with no salvage value, how much did Carol pay for the project?
    Present value tables or a financial calculator are required.
    a. $35,000
    b. $45,414
    c. $72,000
    d. $31,708

    ANS: B
    Use Present Value of Annuity Table (6 years,15%)
    $12,000 * 3.7845 = $45,414

    DIF: Moderate OBJ: 14-4

88. John Browning recently invested in a project that has an expected annual cash inflow of $7,000 for 10 years, and an expected payback period of 3.6 years. How much did John invest in the project?
    a. $19,444
    b. $36,000
    c. $25,200
    d. $40,000

    ANS: C
    x/$7,000 = 3.6 years
    x = $25,200

    DIF: Moderate OBJ: 14-2

89. The Rand Corporation is considering an investment in a project that generates a profitability index of 1.3. The present value of the cash inflows on the project is $44,000. What is the net present value of this project?
    a. $10,154
    b. $13,200
    c. $57,200
    d. $33,846

    ANS: A

PV Cash Inflows/Cash Outflows = Profitability Index $44,000/Cash Outflows = 1.3 $44,000/1.3 = $33,846 PV Cash Inflows - Cash Outflows = Net Present Value $44,000 - $33,846 = $10,154

    DIF: Moderate OBJ: 14-3

90. If r is the discount rate, the formula [1/(1 + r)] refers to the
    a. future value interest factor associated with r for one period.
    b. present value of some future cash flow.
    c. present value interest factor associated with r for one period.
    d. future value interest factor for an annuity with a duration of r periods.

    ANS: C DIF: Easy OBJ: 14-10

91. Future value is the
    a. sum of dollars-in discounted to time zero.
    b. sum of dollars-out discounted to time zero.
    c. difference of dollars-in and dollars-out.
    d. value of dollars-in minus dollars-out for future periods adjusted for any interest-compounding factor.

    ANS: D DIF: Moderate OBJ: 14-10

92. All other things being equal, as the time period for receiving an annuity lengthens,
    a. the related present value factors increase.
    b. the related present value factors decrease.
    c. the related present value factors remain constant.
    d. it is impossible to tell what happens to present value factors from the information given.

    ANS: A DIF: Easy OBJ: 14-10

93. Which of the following indicates that the first cash flow is at the end of a period?

	Ordinary annuity	Annuity due
a.	yes	no
b.	yes	yes
c.	no	yes
d.	no	no

    ANS: A DIF: Easy OBJ: 14-10

94. Assume that X represents a sum of money that Bill has available to invest in a project that will yield a return of r. In the formula Y = X(1 + r), Y represents the
    a. future value of X in one period.
    b. future value interest factor associated with r.
    c. present value of X.
    d. present value interest factor associated with r.

    ANS: A DIF: Easy OBJ: 14-10

95. The capital budgeting technique known as accounting rate of return uses

	salvage value	time value of money
a.	no	no
b.	no	yes
c.	yes	yes
d.	yes	no

    ANS: D DIF: Easy OBJ: 14-11

96. In computing the accounting rate of return, the _____ level of investment should be used as the denominator.
    a. average
    b. initial
    c. residual
    d. cumulative

    ANS: A DIF: Easy OBJ: 14-11

Cody's Retail

Cody's Retail is considering an investment in a delivery truck. Cody has found a used truck that he can purchase for $8,000. He estimates the truck would last six years and increase his store's net cash revenues by $2,000 per year. At the end of six years, the truck would have no salvage value and would be discarded. Cody will depreciate the truck using the straight-line method.

97. Refer to Cody's Retail. What is the accounting rate of return on the truck investment (based on average profit and average investment)?
    a. 25.0%
    b. 50.0%
    c. 16.7%
    d. 8.3%

    ANS: B

$2,000/$4,000 = 50%
Average Investment = ($8,000 + 0)/2 = $4,000

    DIF: Moderate OBJ: 14-11

98. Refer to Cody's Retail. What is the payback period on the investment in the new truck?
    a. 12 years
    b. 6 years
    c. 4 years
    d. 2 years

    ANS: C
    $8,000/$2,000 = 4 years

    DIF: Moderate OBJ: 14-2

99. Linda Smith borrows $50,000 from her bank on January 1. She is to repay the loan in equal annual installments over 30 years. How much is her annual repayment if the bank charges 10 percent interest? **Present value tables or a financial calculator are required.**

    a. $1,667
    b. $4,200
    c. $2,865
    d. $5,304

    ANS: D
    Using the Present Value of Annuity Table (10%, 30 years), the constant is 9.4269.
    $50,000/9.4269 = $5,304

    DIF: Moderate OBJ: 14-10

100. Willard Boone has just turned 65. He has $100,000 to invest in a retirement annuity. One investment company has offered to pay Willard $10,000 per year for 15 years (payments to begin in one year) in exchange for an immediate $100,000 payment. If Willard accepts the offer from the investment company, what is his expected return on the $100,000 investment (assume a return that is compounded annually)? **Present value tables or a financial calculator are required.**
    a. between 5 and 6 percent
    b. between 6 and 7 percent
    c. between 7 and 8 percent
    d. between 8 and 9 percent

    ANS: A
    $100,000/$10,000 = 10.000 PV of annuity Table Factor
    For 15 years, this factor represents a return on investment between 5 and 6 percent.

    DIF: Moderate OBJ: 14-10

101. Gleason Armored Car Co. is considering the acquisition of a new armored truck. The truck is expected to cost $300,000. The company's discount rate is 12 percent. The firm has determined that the truck generates a positive net present value of $17,022. However, the firm is uncertain as to whether its has determined a reasonable estimate of the salvage value of the truck. In computing the net present value, the company assumed that the truck would be salvaged at the end of the fifth year for $60,000. What expected salvage value for the truck would cause the investment to generate a net present value of $0? Ignore taxes. **Present value tables or a financial calculator are required.**

    a. $30,000
    b. $0
    c. $55,278

d. $42,978

ANS: A

Using the Present Value of $1 table (12% and 5 years), the constant is 0.5674.
$17,022/0.5674 = $30,000 salvage value that would yield a salvage value of 0.

DIF: Moderate OBJ: 14-3

102. Steele Publishers is considering an investment that would require an initial cash outlay of $400,000 and would have no salvage value. The project would generate annual cash inflows of $75,000. The firm's discount rate is 8 percent. How many years must the annual cash flows be generated for the project to generate a net present value of $0? **Present value tables or a financial calculator are required.**
a. between 5 and 6 years
b. between 6 and 7 years
c. between 7 and 8 years
d. between 8 and 9 years

ANS: C

$400,000 / $75,000 = $5.33\overline{3}$
Using the Present Value of an Annuity at 8%, the constant falls between 7 and 8 years.

DIF: Moderate OBJ: 14-3

103. A capital budget is used by management to determine

	in what to invest	how much to invest
a.	no	no
b.	no	yes
c.	yes	no
d.	yes	yes

ANS: D DIF: Easy OBJ: 14-1

104. The weighted average cost of capital represents the
a. cost of bonds, preferred stock, and common stock divided by the three sources.
b. equivalent units of capital used by the organization.
c. overall cost of capital from all organization financing sources.
d. overall cost of dividends plus interest paid by the organization.

ANS: C DIF: Easy OBJ: 14-1

SHORT ANSWER

1. In a net present value analysis, how can an analyst explicitly and formally consider the influence of risk on the present value of certain cash flows?

   ANS:
   An analyst could do at least three different things to explicitly account for risk. The analyst could: (1) adjust the discount rate to reflect the risk of the cash flow, (2) adjust the discounting period of the cash flow, or (3) adjust the expected amount of the cash flow up or down to reflect the risk.

   DIF: Moderate OBJ: 14-8

2. What factors influence the present value of the depreciation tax benefit?

   ANS:
   The depreciation tax benefit is primarily affected by three factors: the depreciation rate or method, the tax rate, and the discount rate.

   DIF: Moderate OBJ: 14-5

3. Why is it important for managers to be able to rank projects?

   ANS:
   Managers need to be able to rank projects for two primary reasons. First, managers need to be able to select the best project from a set of projects that are directly competing with each other (particularly in the case of mutually exclusive projects). Second, even when projects are not directly competing with each other, managers may have a limited supply of capital that has to be allocated to the most worthy of the projects.

   DIF: Moderate OBJ: 14-7

4. If it is assumed that managers act to maximize the value of the firm, what can also be assumed about the existing mix of capital components relative to the set of all viable alternative mixes of capital components?

   ANS:
   It can be assumed that the existing mix of capital components is the one that minimizes the cost of capital (which, therefore, maximizes the value of the firm).

   DIF: Moderate OBJ: 14-1

5. Does a project that generates a positive internal rate of return also have a positive net present value? Explain.

   ANS:
   No. A positive IRR does not necessarily mean that a project will also have a positive NPV. Only if the IRR is greater than the discount rate that is used in the NPV calculation will the NPV be positive.

   DIF: Moderate OBJ: 14-6

6. Why is the profitability index a better basis than net present value to compare projects that require different levels of investment?

   ANS:
   The profitability index relates the magnitude of the net present value to the magnitude of the initial investment. Thus, the PI gives some indication of relative profitability. The NPV itself provides no direct indication of the level of investment that is required to generate the NPV and therefore provides no indication of relative profitability.

   DIF: Moderate OBJ: 14-6

7. What is the major advantage of the accounting rate of return relative to the other techniques that can be used to evaluate capital projects?

   ANS:
   The accounting rate of return has two major advantages relative to the other capital budgeting techniques. First, it may be more compatible as an investment criterion with criteria that are used to evaluate managerial and segment performance particularly for investment centers that are evaluated on an ROI or RI basis. Second, the accounting rate of return can be generated from accounting data and is therefore easy to track over the life of the investment.

   DIF: Moderate OBJ: 14-11

8. Why is it important for organizations to conduct post investment audits of capital projects?

   ANS:
   The post investment audit provides management with an opportunity to evaluate the actual performance of the investment relative to expected performance. If possible, management can take corrective action when actual performance is poor relative to the expected performance. Management can also use the post investment audit to evaluate the performance of those who provided the original information about the investment and those who are in charge of the investment. In addition, management may use the information from the post investment audit to improve the evaluation process of future capital projects.

   DIF: Moderate OBJ: 14-9

9. How are capital budgeting models affected by potential investments in automated equipment investment decisions?

   ANS:
   Discount rates for present value calculations often far exceed a firm's cost of capital. Automated machinery is very costly and may be at a disadvantage in discounted cash flow methods. Qualitative factors associated with automated equipment may not receive any weight or value in current capital budgeting methods. Automated equipment is often interrelated with other investments and should be bundled to reflect this synergism. Finally, there is the opportunity cost of not automating when competitors automate and your firm doesn't.

   DIF: Moderate OBJ: 14-8

10. What are the limitations of the payback period as a capital budgeting technique?

    ANS:
    The payback period ignores the time value of money. It also ignores a company's desired rate of return. Finally, the payback period ignores cash inflows occurring after the payback period has been reached.

    DIF: Moderate OBJ: 14-2

PROBLEM

Small Corporation

Small Corporation is considering an investment that will require an initial cash outlay of $200,000 to purchase non-depreciable assets. The project promises to return $60,000 per year (after-tax) for eight years with no salvage value. The company's cost of capital is 11 percent.

1. Refer to Small Corporation. The company is uncertain about its estimate of the life expectancy of the project. How many years must the project generate the $60,000 per year return for the company to at least be indifferent about its acceptance? (Do not consider the possibility of partial year returns.)

   Present value tables or a financial calculator are required.

   ANS:
   Dividing $200,000/$60,000, gives the annuity discount factor (3.3333) for 11 percent associated with the minimal required time for this project to be successful. According to the tables in Appendix A, the project will have a positive net present value if the cash flows last through year 5.

   DIF: Moderate OBJ: 14-10

Serkin Corporation

Serkin Corporation is considering an investment in a new product line. The investment would require an immediate outlay of $100,000 for equipment and an immediate investment of $200,000 in working capital. The investment is expected to generate a net cash inflow of $100,000 in year 1, $150,000 in year 2, and $200,000 in years 3 and 4. The equipment would be scrapped (for no salvage) at the end of the fourth year and the working capital would be liquidated. The equipment would be fully depreciated by the straight-line method over its four-year life.

2. Refer to Serkin Corporation. If Serkin uses a discount rate of 16 percent, what is the NPV of the proposed product line investment?

   Present value tables or a financial calculator are required.

ANS:

Cash flow	Year	Amount	Discount factor	Present value
Investment	0	$(100,000)	1.00	$(100,000)
Working cap.	0	$(200,000)	1.00	(200,000)
Cash inflow	1	100,000	.8621	86,210
Cash inflow	2	150,000	.7432	111,480
Cash inflow	3	200,000	.6407	128,140
Cash inflow	4	200,000	.5523	110,460
Working cap.	4	200,000	.5523	110,460
Net present value				$246,750

DIF: Moderate OBJ: 14-3

3. Refer to Serkin Corporation. What is the payback period for the investment?

ANS:
After the first two years, $250,000 of the original $300,000 investment would be recouped. It would take one-quarter of the third year ($50,000/$200,000) to recoup the last $50,000. Thus, the payback period is 2.25 years.

DIF: Moderate OBJ: 14-2

4. Adam Ball has an opportunity to invest in a project that will yield four annual payments of $12,000 with no salvage. The first payment will be received in exactly one year. On low-risk projects of this type, Ball requires a return of 6 percent. Based on this requirement, the project generates a profitability index of 1.03953.

Present value tables or a financial calculator are required.

a. How much is Adam required to invest in this project?
b. What is the internal rate of return on Adam's project?

ANS:

a. The present value of the $12,000 annuity is found by multiplying $12,000 by the annuity discount factor associated with 6 percent interest for four years: $12,000 × 3.4651 = $41,581.20.

   From the information on the profitability index, it is known that the present value of the cash inflows is 1.03953 times the initial investment. Thus, the initial investment is $41,581.20/1.03953 = $40,000.

b. By dividing $40,000 by the annual cash inflow of $12,000, it is determined that the discount factor associated with the IRR is 3.3333. This discount factor is associated with an interest rate that lies between 7 and 8 percent. Using interpolation, the IRR is computed to be approximately 7.72 percent.

DIF: Moderate OBJ: 14-4

5. Pitt Productions is considering the purchase of a new movie camera, which will be used for major motion pictures. The new camera will cost $30,000, have an eight-year life, and create cost savings of $5,000 per year. The new camera will require $700 of maintenance each year. Pitt Productions uses a discount rate of 9 percent.

   Present value tables or a financial calculator are required.

   a. Compute the net present value of the new camera.
   b. Determine the payback period.

   ANS:

   a.

Cost savings per year	$5,000
Maintenance per year	(700)
Net cash flows per year	$4,300

Cash	Discount factor	Present value
$30,000	1.0000	$(30,000.00)
4,300	5.5348	23,799.64
Net present value of investment		$ (6,200.36)

   b. Payback equals $30,000/$4,300 = 6.976 years

   DIF: Moderate OBJ: 14-3

6. Riordan Corporation is interested in purchasing a state-of-the-art widget machine for its manufacturing plant. The new machine has been designed to basically eliminate all errors and defects in the widget-making production process. The new machine will cost $150,000, and have a salvage value of $70,000 at the end of its seven-year useful life. Riordan has determined that cash inflows for years 1 through 7 will be as follows: $32,000; $57,000; $15,000; $28,000; $16,000; $10,000, and $15,000, respectively. Maintenance will be required in years 3 and 6 at $10,000 and $7,000 respectively. Riordan uses a discount rate of 11 percent and wants projects to have a payback period of no longer than five years.

   Present value tables or a financial calculator are required.

   a. Compute the net present value of the new machine.

   b. Compute the firm's profitability index.

   c. Compute the payback period.

   d. Evaluate this investment proposal for XYZ Co.

ANS:

a.

Year	Cash flow	Discount factor	Present value
1	$150,000	1.0000	$(150,000.00)
1	32,000	.9009	28,828.80
2	57,000	.8116	46,261.20
3	5,000	.7312	3,656.00
4	28,000	.6587	18,443.60
5	16,000	.5935	9,496.00
6	3,000	.5346	1,603.80
7	15,000	.4817	7,225.50
7	70,000	.4817	33,719.00
Net present value			$ (766.10)

b. Profitability index equals present value of cash flows divided by investment: $149,233.90/$150,000 = .995

c. Payback period is 6.11 years, computed as follows:

Year	Cash Flow	Cumulative Cash Flow
1	$32,000	$ 32,000
2	57,000	89,000
3	5,000	94,000
4	28,000	122,000
5	16,000	138,000
6	3,000	141,000
7	85,000	226,000

$150,000 - $141,000 = $9,000/$85,000 = .11

d. The project is quantitatively unacceptable because it has a negative NPV, a less-than-one PI, and a payback period of over six years. However, the NPV and PI are extremely close to being acceptable. Because the new machine will provide XYZ zero-defect production, the investment may be desirable if additional qualitative factors are considered such as improved competitive position, customer satisfaction, goodwill generated, improved product quality and reliability, and a desire to be in the forefront of manufacturing capability. XYZ may want to attempt to quantify these benefits and reevaluate the machine's acceptability as an investment.

DIF: Difficult OBJ: 14-3

7. The Reed Company has been operating a small lunch counter for the convenience of employees. The counter occupies space that is not needed for any other business purpose. The lunch counter has been managed by a part-time employee whose annual salary is $3,000. Yearly operations have consistently shown a loss as follows:

Receipts		$20,000
Expenses for food, supplies (in cash)	$19,000	
Salary	3,000	22,000
Net Loss		$(2,000)

A company has offered to sell Reed Company automatic vending machines for a total cost of $12,000. Sales terms are cash on delivery. The old equipment has zero disposal value.

The predicted useful life of the equipment is 10 years, with zero scrap value. The equipment will easily serve the same volume that the lunch counter handled. A catering company will completely service and supply the machines. Prices and variety of food and drink will be the same as those that prevailed at the lunch counter. The catering company will pay 5 percent of gross receipts to the Reed Company and will bear all costs of food, repairs, and so forth. The part-time employee will be discharged. Thus, Reed Company's only cost will be the initial outlay for the machines.

Consider only the two alternatives mentioned. **Present value tables or a financial calculator are required.**

Required:

a. What is the annual income difference between alternatives?

b. Compute the payback period.

c. Compute:
   1. The net present value if relevant cost of capital is 20 percent.
   2. Internal rate of return.

d. Management is very uncertain about the prospective revenue from the vending equipment. Suppose that the gross receipts amounted to $14,000 instead of $20,000. Repeat the computation in part c.1.

e. What would be the minimum amount of annual gross receipts from the vending equipment that would justify making the investment? Show computations.

ANS:

a. Old loss $(2,000)

New receipts $20,000 × 5% =	$ 1,000
Depr. $12,000/10 yrs. =	(1,200)
New (Loss)	$ (200)

b. Change in annual cash inflow is $3,000
   Payback = $12,000/$3,000 = 4 yrs.

c. 1.

PV of inflow $3,000 × 4.1925 =	$12,577.50
PV of outflow $12,000 × 1.0 =	(12,000.00)
NPV	$ 577.50

2. IRR is approximately 23%

d. Change in inflow = $2,700

PV inflow $2,700 × 4.1925 =	$11,319.75
PV outflow $12,000 × 1.0 =	(12,000.00)
NPV	$ (680.25)

e. $12,000/4.1925 = $2,862.25
Receipts = ($2,862.25 - $2,000)/.05 = $17,245

DIF: Moderate OBJ: 14-4

8. The Spotless Automobile Corporation is contemplating the acquisition of an automatic car wash. The following information is relevant:

The cost of the car wash is $160,000
The anticipated revenue from the car wash is $100,000 per annum.
The useful life of the car wash is 10 years.
Annual operating costs are expected to be:

Salaries	$30,000
Utilities	9,600
Water usage	4,400
Supplies	6,000
Repairs/maintenance	10,000

The firm uses straight-line depreciation.
The salvage value for the car wash is zero.
The company's cutoff points are as follows:

Payback	3 years
Accounting rate of return	18%
Internal rate of return	18%

Ignore income taxes.

Required:

a. Compute the annual cash inflow.

b. Compute the net present value.

c. Compute internal rate of return.

d. Compute the payback period.

e. Compute the profitability index.

f. Should the car wash be purchased?

ANS:

a.	Revenue	$100,000
	- cash expenses	(60,000)
	Annual inflow	$ 40,000
b.	PV inflow $40,000 × 4.4941 =	$179,764
	PV outflow $160,000 × 1.0 =	(160,000)
	NPV =	$ 19,764

c. IRR factor = $160,000/$40,000 = 4.0 which is approximately 23%

d. Payback = $160,000/$40,000 = 4 yrs.

e. $179,764/$160,000 = 1.123525

f. Car wash exceeds minimum on SRR and IRR, but not payback.

DIF: Moderate OBJ: 14-4