



F O T A M A T

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1CHAPTER 13CAPITAL BUDGETING DECISION**Capital budgeting decision methods:**

- Payback method
- The net present value method
- The internal rate of return method
- The simple rate of return method

capital budgeting decision

Any decision that involves a cash outlay now to obtain future return is a capital budgeting decision

Typical capital budgeting decision include:

1-cost reduction decision

2-expansion decision

3-equipment selection

4-lease or buy decision

5-equipment replacement decision

Capital budgeting decision:

1-Screening decision

Relate to whether the proposed project is acceptable whether it passes a present hurdle

2-Preference decision

Relate to selection among several acceptable alternatives

1) Amster Corporation has not yet decided on the required rate of return to use in its capital budgeting. This lack of information will prevent Amster from calculating a project's:

	Payback	Net Present Value	Internal Rate of Return
A)	No	No	No
B)	Yes	Yes	Yes
C)	No	Yes	Yes
D)	No	Yes	No

- A) Choice A
 B) Choice B
 C) Choice C
D) Choice D

2) Rennin Dairy Corporation is considering a plant expansion decision that has an estimated useful life of 20 years. This project has an internal rate of return of 15% and a payback period of 9.6 years. How would a decrease in the expected salvage value from this project in 20 years affect the following for this project?

	Internal Rate of Return	Payback Period
A)	Decrease	Decrease
B)	No effect	Decrease
C)	Decrease	No effect
D)	Increase	No effect
E)	No effect	No effect

- A) Choice A
 B) Choice B
C) Choice C
 D) Choice D
 E) Choice E

3) The project profitability index and the internal rate of return:

- A) will always result in the same preference ranking for investment projects.
B) will sometimes result in different preference rankings for investment projects.
 C) are less dependable than the payback method in ranking investment projects.
 D) are less dependable than net present value in ranking investment projects.

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CASH FLOWS VERSUS NET OPERATING INCOME

Payback method	
the net present value method	
the internal rate of return method	
the simple rate of return method	

typical cash outflows:

- 1-for the initial investment
- 2-expanding the working capital
- 3-Repairs and maintenance and additional operating cost

typical cash inflows:

- 1-increase revenues
- 2-reduce cost
- 3-salvage value
- 4-working capital

time value of money

The time value of money: recognizes that a dollar today is worth more than a dollar a year from now

3**The payback method**

Is the length of time that it takes for a project to recover its initial cost from the net cash inflows that it generates. The time that it takes for an investment to pay for itself

- $\text{Payback period} = \text{investment required} / \text{annual net cash inflow}$
- A project with a short payback period but a low rate of return might be preferred over another project with a high rate of return but a long payback period

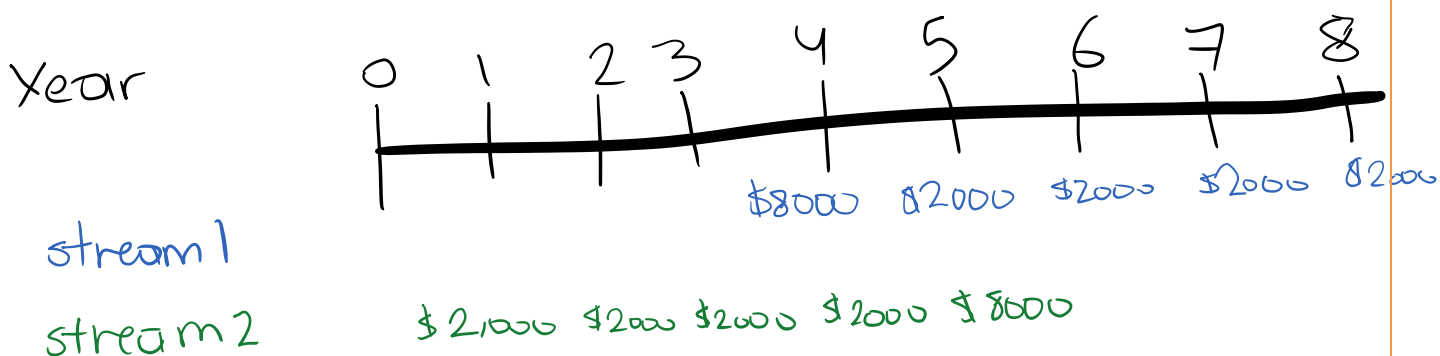
Shortage of payback method

- it ignores all cash flows that occur after the payback period
- doesn't consider the time value of money

York company need a new milling machine. The company is considering two machines: machine A and machine B. Machine A costs \$15,000, has a useful life of ten years, and will reduce operating cost by \$5,000 per year. Machine B costs only \$12,000, will also reduce operating costs by \$5,000 per year, but has a useful life only five years.

Which machine should be purchased according to the payback method?

Assume that for an investment of \$8,000 you can purchase either of the two following streams of cash inflows:



Which stream of cash inflows would you prefer to receive in return for your \$8,000 investment?

4

Goodtime fun centers, Inc., operates amusement parks. Some of the vending machines in one of its parks provide very little revenues, so the company is considering removing the machines and installing equipment to dispense soft ice cream. The equipment would cost \$80,000 and have an eight-year useful life with no salvage value. Incremental annual revenues and costs associated with the sale of ice cream would be as follows:

Sales	\$150,000
Variable expenses	90,000
Contribution margin	60,000
Fixed expenses:	
Salaries	27,000
Maintenance	3,000
Depreciation	10,000
Total fixed expenses	40,000
Net operating income	\$ 20,000

The vending machines can be sold for a \$5,000 scrap value. The company will not purchase the equipment unless it has a payback period of three years or less. Does the ice cream dispenser pass this hurdle?

1	When a company is cash poor, a project with a short payback period but a low rate of return may be preferred to a project with a long payback period and a high rate of return.	TRUE
2	A shorter payback period does not necessarily mean that one investment is more desirable than another.	TRUE
3	The payback method is most appropriate for projects whose cash flows do not extend far into the future.	TRUE
	In the payback method, depreciation is added back to net operating income when computing the annual net cash flow.	TRUE
	In calculating the payback period where new equipment is replacing old equipment, any salvage value to be received on disposal of the old equipment should be deducted from the cost of the new equipment.	TRUE

1) Purvell Corporation has just acquired a new machine with the following characteristics (Ignore income taxes.):

Cost of the equipment	\$ 50,000
Annual cash savings	\$ 15,000
Life of the machine	8 years

The company uses straight-line depreciation and a \$5,000 salvage value. Assume cash flows occur uniformly throughout a year except for the initial investment and the salvage at the end of the project.

The payback period is closest to:

- A) **3.33 years**
- B) 3.0 years
- C) 8.0 years
- D) 2.9 years

2) The Zingstad Corporation is considering an investment with the following data (Ignore income taxes.):

	Year 1	Year 2	Year 3	Year 4	Year 5
Investment	\$ 32,000	\$ 12,000			
Cash inflow	\$ 8,000	\$ 8,000	\$ 20,000	\$ 16,000	\$ 16,000

Cash inflows occur evenly throughout the year. The payback period for this investment is:

- A) 3.0 years
- B) **3.5 years**
- C) 4.0 years
- D) 4.5 years

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PAYBACK AND UNEVEN CASH FLOWS

Year	Investment	Cash inflow
1	\$ 4,000	\$ 1,000
2		\$ 0
3		\$ 2,000
4	\$ 2,000	\$ 1,000
5		\$ 5,00
6		\$ 3000
7		\$ 2,000

Compute the payback period

Year	Investment	Cash inflow	Uncovered investment

1) Jarvey Corporation is studying a project that would have a ten-year life and would require a \$450,000 investment in equipment which has no salvage value. The project would provide net operating income each year as follows for the life of the project (Ignore income taxes.):

Sales		\$ 500,000
Less cash variable expenses		<u>200,000</u>
Contribution margin		300,000
Less fixed expenses:		
Fixed cash expenses	\$ 150,000	
Depreciation expenses	<u>45,000</u>	<u>195,000</u>
Net operating income		<u>\$ 105,000</u>

The company's required rate of return is 12%. The payback period for this project is closest to:

- A) **3 years**
- B) 2 years
- C) 4.28 years
- D) 9 years

2) The management of Lanzilotta Corporation is considering a project that would require an investment of \$263,000 and would last for 8 years. The annual net operating income from the project would be \$66,000, which includes depreciation of \$31,000. The scrap value of the project's assets at the end of the project would be \$15,000. The cash inflows occur evenly throughout the year. The payback period of the project is closest to (Ignore income taxes.):

- A) 3.8 years
- B) 2.6 years
- C) **2.7 years**
- D) 4.0 years

3) A company with \$500,000 in operating assets is considering the purchase of a machine that costs \$60,000 and which is expected to reduce operating costs by \$15,000 each year. These reductions in cost occur evenly throughout the year. The payback period for this machine in years is closest to (Ignore income taxes.):

- A) 0.25 years
- B) 8.3 years
- C) **4 years**
- D) 33.3 years

4) Buy-Rite Pharmacy has purchased a small auto for delivering prescriptions. The auto was purchased for \$24,000 and will have a 6-year useful life and a \$6,000 salvage value. Delivering prescriptions (which the pharmacy has never done before) should increase gross revenues by at least \$28,000 per year. The cost of these prescriptions to the pharmacy will be about \$22,000 per year. The pharmacy depreciates all assets using the straight-line method. The payback period for the auto is closest to (Ignore income taxes.):

- A) 2 years
- B) 1.8 years
- C) 4 years**
- D) 1.2 years

5) Vandezande Inc. is considering the acquisition of a new machine that costs \$370,000 and has a useful life of 5 years with no salvage value. The incremental net operating income and incremental net cash flows that would be produced by the machine are (Ignore income taxes.):

	Incremental Net Operating Income	Incremental Net Cash Flows
Year 1	\$ 54,000	\$ 128,000
Year 2	\$ 31,000	\$ 105,000
Year 3	\$ 52,000	\$ 126,000
Year 4	\$ 49,000	\$ 123,000
Year 5	\$ 48,000	\$ 122,000

Assume cash flows occur uniformly throughout a year except for the initial investment.

The payback period of this investment is closest to:

- A) 2.9 years
- B) 4.9 years
- C) 3.1 years**
- D) 5.0 years

6

THE NET PRESENT VALUE

Assumptions

- they assume all cash flows other than initial investment occur at the end of period the
- All cash flows generated by an investment project are immediately reinvested at a rate of return equal to the rate used to discount the future cash flows

Harper company is contemplating buying a new machine that will cost \$50,000 and last for five years. The new machine will enable the company to reduce its labor costs by \$18,000 per year. At the end of the five-year period, the company will sell the machine for its salvage value of \$50,000. Harper company requires a minimum pretax return of %18 on all investment projects. Should the machine be purchased?

	year					
	now	1	2	3	4	5

If net present value is	Then the project is
Positive	Acceptable because its return is greater than required rate of return
Zero	Acceptable because its return is equal to the required rate of return
negative	Acceptable because its return is less than required rate of return

- The cost of capital: the average rate of return that the company must pay to its long-term creditors and its shareholders for the use of their funds.
- If the project rate of return less than the cost of capital should be rejected.

1	The required rate of return is the maximum rate of return that an investment project must yield to the acceptable.	FALSE
2	The cost of capital is the average rate of return that the company earns on its investments.	FALSE
3	The net present value method assumes that cash flows from a project are immediately reinvested at a rate of return equal to the internal rate of return.	FALSE

1) Some investment projects require that a company increase its working capital. Under the net present value method, the investment and eventual recovery of working capital should be treated as:

- A) an initial cash outflow.
- B) a future cash inflow.
- C) both an initial cash outflow and a future cash inflow.**
- D) irrelevant to the net present value analysis.

2) A company has unlimited funds to invest at its discount rate. The company should invest in all projects having:

- A) an internal rate of return greater than zero.
- B) a net present value greater than zero.**
- C) a simple rate of return greater than the discount rate.
- D) a payback period less than the project's estimated life.

3) If the net present value of a project is zero based on a discount rate of 16%, then the internal rate of return is:

- A) equal to 16%.**
- B) less than 16%.
- C) greater than 16%.
- D) cannot be determined from this data.

7

Under a special licensing arrangement, Swinyard corporation has an opportunity to market a new product for a five-year period. The product would be purchased from the manufacturer, with Swinyard responsible for promotion and distribution costs. The licensing arrangement could be renewed at the end of the five year period. After careful study, swinyard estimated the following costs and revenues for the new product

Cost of equipment needed	\$ 60,000
Working capital needed	\$ 100,000
Overhaul of the equipment in four years	\$ 5,000
Salvage value of the equipment in five years	\$ 10,000
Annual revenues and costs:	
Sales revenue	\$ 200,000
Cost of goods sold	\$ 125,000
Out-of-pocket operating costs (for salaries, advertising, and other direct costs)	\$ 35,000

At the end of the five-year period, if Swinyard decides not to renew the licensing arrangement the working capital would be released for investment elsewhere. Swinyard uses a 14% discount rate. Would you recommend that the new product be introduced?

8

Consider the following three investment opportunities:

Project I would require an immediate cash outlay of \$40,000 and would result in cash savings of \$9,000 each year for 5 years.

Project II would require cash outlays of \$7,000 per year and would provide a cash inflow of \$40,000 at the end of 5 years.

Project III would require a cash outlay of \$36,000 now and would provide a cash inflow of \$60,000 at the end of 5 years. (Ignore income taxes.)

Required:

The discount rate is 10%. Use the net present value method to determine which, if any, of the three projects is acceptable.

9

Gallatin, Inc., has assembled the estimates shown below relating to a proposed new product. These estimates are based on a 5-year project life, at the end of which the new equipment would be sold, working capital would revert to other uses in the company, and the product would be discontinued. Gallatin uses a discount rate of 10%. (Ignore income taxes.)

Annual cash sales	\$ 450,000
Annual out-of-pocket cash expenses	\$ 340,000
Annual depreciation on new equipment	\$ 52,000
Initial cost of new equipment	\$ 300,000
Salvage value of equipment in 5 years	\$ 50,000
Working capital requirement	\$ 60,000

Required:

Compute the net present value of the new product.

	Year		

1	Discounted cash flow techniques automatically take into account recovery of the initial investment.	TRUE
2	When discounted cash flow methods of capital budgeting are used, the working capital required for a project is ordinarily counted as a cash outflow at the beginning of the project and as a cash inflow at the end of the project.	TRUE

1) Parks Corporation is considering an investment proposal in which a working capital investment of \$10,000 would be required. The investment would provide cash inflows of \$2,000 per year for six years. The working capital would be released for use elsewhere when the project is completed. If the company's discount rate is 10%, the investment's net present value is closest to (Ignore income taxes.):

- A) \$1,290
- B) \$(1,290)
- C) \$2,000
- D) \$4,350**

2) Penniston Corporation is considering a capital budgeting project that would require an initial investment of \$630,000 and working capital of \$73,000. The working capital would be released for use elsewhere at the end of the project in 3 years. The investment would generate annual cash inflows of \$228,000 for the life of the project. At the end of the project, equipment that had been used in the project could be sold for \$29,000. The company's discount rate is 12%. The net present value of the project is closest to:

- A) \$(134,696)
- B) \$(82,720)**
- C) \$(9,720)
- D) \$54,000

3) Dowlen, Inc. is considering the purchase of a machine that would cost \$150,000 and would last for 6 years. At the end of 6 years, the machine would have a salvage value of \$23,000. The machine would reduce labor and other costs by \$36,000 per year. Additional working capital of \$6,000 would be needed immediately. All of this working capital would be recovered at the end of the life of the machine. The company requires a minimum pretax return of 12% on all investment projects. The net present value of the proposed project is closest to (Ignore income taxes.):

- A) \$9,657
- B) \$(2,004)
- C) \$6,699**
- D) \$13,223

4- In an effort to reduce costs, Pontic Manufacturing Corporation is considering an investment in equipment that will reduce defects. This equipment will cost \$420,000, will have an estimated useful life of 10 years, and will have an estimated salvage value of \$50,000 at the end of 10 years. The company's discount rate is 22%. What amount of cost savings will this equipment have to generate per year in each of the 10 years in order for it to be an acceptable project? (Ignore income taxes.).

- A) \$50,690 or more
- B) \$41,315 or more
- C) \$105,315 or more**
- D) \$94,316 or more

5) Byerly Corporation has provided the following data concerning an investment project that it is considering:

Initial investment	\$ 670,000
Working capital	\$ 61,000
Annual cash flow	\$ 227,000 per year
Salvage value at the end of the project	\$ 20,000
Expected life of the project	3 years
Discount rate	10%

The working capital would be released for use elsewhere at the end of the project. The net present value of the project is closest to:

- A) \$(151,658)
- B) \$(105,847)**
- C) \$11,000
- D) \$(44,847)

6) Charlie Corporation is considering buying a new donut maker. This machine will replace an old donut maker that still has a useful life of 6 years. The new machine will cost \$3,600 a year to operate, as opposed to the old machine, which costs \$3,800 per year to operate. Also, because of increased capacity, an additional 20,000 donuts a year can be produced. The company makes a contribution margin of \$0.10 per donut. The old machine can be sold for \$7,000 and the new machine costs \$30,000. The incremental annual net cash inflows provided by the new machine would be (Ignore income taxes.):

- A) \$2,200**
- B) \$200
- C) \$2,000
- D) \$5,000

10

Jim Bingham is considering starting a small catering business. He would invest \$125,000 to purchase a delivery van and various equipment and another \$60,000 for inventories and other working capital needs. Rent for the building used by the business will be \$35,000 per year. In addition to the building rent, annual cash outflow for operating costs will amount to \$40,000. The annual cash inflow from the business will amount to \$120,000. Jim wants to operate the catering business for only six years. He estimates that the equipment could be sold at that time for 4% of its original cost. Jim uses a 16% discount rate. All cash flows, except for the initial investment, would occur at the ends of the years. The investment in working capital would be returned at the end of the six years. (Ignore income taxes.)

Required:

Compute the net present value of this investment.

1) Anthony operates a part time auto repair service. He estimates that a new diagnostic computer system will result in increased cash inflows of \$1,500 in Year 1, \$2,100 in Year 2, and \$3,200 in Year 3. If Anthony's required rate of return is 10%, then the most he would be willing to pay for the new diagnostic computer system would be (Ignore income taxes.):

- A) \$4,599
- B) \$5,501**
- C) \$5,638
- D) \$5,107

2) A company has provided the following data concerning a proposed project:

Initial investment	\$	10,000
Annual cost savings	\$?
Salvage value	\$	0
Life of the project		8 years
Discount rate		14%
Net present value	\$	1,300

The annual cost savings must be closest to:

- A) \$4,024
- B) \$2,436**
- C) \$1,875
- D) \$3,704

3) Cannula Vending Corporation is expanding operations and needs to purchase additional vending machines. There are currently two companies, Viscera, Inc. and Gullet International, that produce and sell machines that will do the job. Information related to the specifications of each company's machine are as follows (Ignore income taxes.):

	Viscera	Gullet
Purchase price per machine	\$ 18,000	\$ 24,000
Useful life of machine	5 years	5 years
Expected salvage value of machine in 5 years	\$ 2,000	\$ 5,000
Estimated annual operating cost per machine	\$ 4,000	\$ 3,000

Cannula's discount rate is 18%. Cannula uses the straight-line method of depreciation. Using net present value analysis, which company's machine should Cannula purchase and what is the approximate difference between the net present values of the competing company's machines?

- A) Gullet, \$127
- B) Viscera, \$1,562**
- C) Viscera, \$1,749
- D) Viscera, \$3,438

حل ذاتي

مرات نستخدم المقارنة عشان نختار هل نبقى الشيء ام نشترى جديد.

Harper ferry company operates a high speed passenger ferry service across the Mississippi river. One of its ferryboats is in poor condition. This ferry can be renovated at an immediate cost of \$ 200,000. Further repairs and an overhaul of the motor will be needs three years from now at a cost of \$ 80,000. In all, the ferry will be useable for 5 years if this work is done. At the end of 5 years, the ferry will have to be scrapped at a salvage value of \$ 60,000. The scrap value of the ferry right now is \$ 70,000. It will cost \$ 300,000 each year to operate the ferry, and revenues will total \$ 400,000 annually.

As an alternative, harper ferry company can purchase a new ferryboat at a cost of \$ 360,000. The new ferry will have a life of 5 years, the ferry will have a scrap value of \$ 60,000. It will cost \$ 210,000 each year to operate the ferry, and revenues will total \$ 400,000 annually.

Harper ferry company requires a return of at least % 14 on all investment projects.

Should the company purchase the new ferry or renovate the old ferry?

Keep the old ferry	Now	Year				
		1	2	3	4	5
Renovation	\$ (200,000)					
Annual revenues		\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000
Annual cash operating costs		\$ (300,000)	\$ (300,000)	\$ (300,000)	\$ (300,000)	\$ (300,000)
Repairs in three years				\$ (80,000)		
Salvage value of old ferry						\$ 60,000
Total cash flows	\$ (200,000)	\$ 100,000	\$ 100,000	\$ 20,000	\$ 100,000	\$ 160,000
Discount factor % 14	1	.877	.769	.675	.592	.519
Present value of cash flows	\$ (200,000)	\$ 87,700	\$ 76,900	\$ 13,500	\$ 59,200	\$ 83,040
Net present value	\$ 120,340					

But the new ferry	Now	year				
		1	2	3	4	5
Initial investment	\$ (360,000)					
Salvage value of old ferry	\$ 70,000					
Annual revenues		\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000
Annual cash operating costs		\$ (210,000)	\$ (210,000)	\$ (210,000)	\$ (210,000)	\$ (210,000)
Repairs in three years				\$ (30,000)		
Salvage value of new ferry						\$ 60,000
Total cash flows	\$ (290,000)	\$ 190,000	\$ 190,000	\$ 160,000	\$ 190,000	\$ 250,000
Discount factor % 14	1	.877	.769	.675	.592	.519
Present value of cash flows	\$ (290,000)	\$ 166,630	\$ 146,110	\$ 108,000	\$ 112,480	\$ 129,750
Net present value	\$ 372,970					

1) Orbit Airlines is considering the purchase of a new \$275,000 maintenance hangar. The new hangar has an estimated useful life of 5 years with an expected salvage value of \$50,000. The new hangar is expected to generate cost savings of \$90,000 per year in each of the 5 years. A \$20,000 increase in working capital will also be needed for this new hangar. The working capital will be released at the end of the 5 years. Orbit's discount rate is 18%. What is the net present value of the new hangar?

- A) \$8,280
- B) \$9,440
- C) \$17,020**
- D) \$28,280

2) Vandezande Inc. is considering the acquisition of a new machine that costs \$370,000 and has a useful life of 5 years with no salvage value. The incremental net operating income and incremental net cash flows that would be produced by the machine are (Ignore income taxes.):

	Incremental Net Operating Income	Incremental Net Cash Flows
Year 1	\$ 54,000	\$ 128,000
Year 2	\$ 31,000	\$ 105,000
Year 3	\$ 52,000	\$ 126,000
Year 4	\$ 49,000	\$ 123,000
Year 5	\$ 48,000	\$ 122,000

Assume cash flows occur uniformly throughout a year except for the initial investment.

If the discount rate is 10%, the net present value of the investment is closest to:

- A) \$370,000
- B) \$457,479
- C) \$234,000
- D) \$87,479**

3) Treads Corporation is considering the purchase of a new machine to replace an old machine that is currently being used. The old machine is fully depreciated but can be used by the corporation for five more years. If Treads decides to buy the new machine, the old machine can be sold for \$60,000. The old machine would have no salvage value in five years.

The new machine would be purchased for \$1,000,000 in cash. The new machine has an expected useful life of five years with no salvage value. Due to the increased efficiency of the new machine, the company would benefit from annual cash savings of \$300,000.

Treads Corporation uses a discount rate of 12%. (Ignore income taxes.)

The net present value of the project is closest to:

- A) \$171,000
- B) \$136,400
- C) \$141,500**
- D) \$560,000

حل ذاتي

مرات نحتاج نتخذ قرار بالشئ الذي يكلفنا اقل فبهالحالة نختار الأقل

Least cost decision

Val-tek company is considering replacing an old threading machine with a new threading machine that would substantially reduce annual operating costs. Selected data related to the old and new machine are presented below:

	Old machine	New machine
Purchase cost when new	\$ 200,000	\$ 250,000
Salvage value now	\$ 30,000	
Annual cash operating costs	\$ 150,000	\$ 90,000
Overhaul needed immediately	\$ 40,000	
Salvage value in six years	\$ 0	\$ 50,000
Remaining life	6 years	6 years

Should the company keep the old machine or buy new one?

Keep the old machine		years
	now	1-6
Overhaul needed now	\$ (40,000)	
Annual cash operating costs		\$ (150,000)
Total cash flows	\$ (40,000)	\$ (150,000)
Discount factor %10	1	4.355
Present value of cash flows	\$ (40,000)	\$ (653,250)
Net present value	\$ (693,250)	

buy the new machine		years	
	now	1-6	6
Initial investment	\$ (40,000)		
Salvage value of old machine	\$ 30,000		
Annual cash operating costs		\$ (90,000)	
Salvage value of new machine			\$ 50,000
Total cash flows	\$ (220,000)	\$ (90,000)	\$ 50,000
Discount factor %10	1	4.355	.564
Present value of cash flows	\$ (220,000)	\$ (391,950)	\$ 28,200
Net present value	\$ (583,750)		

Financially Better to Buy the new machine

1) Morrel University has a small shuttle bus that is in poor mechanical condition. The bus can be either overhauled now or replaced with a new shuttle bus. The following data have been gathered concerning these two alternatives (Ignore income taxes.):

	Present Bus	New Bus
Purchase cost new	\$ 32,000	\$ 40,000
Remaining net book value	\$ 21,000	-
Major repair needed now	\$ 9,000	-
Annual cash operating costs	\$ 12,000	\$ 8,000
Salvage value now	\$ 10,000	-
Trade-in value in seven years	\$ 2,000	\$ 5,000

The University could continue to use the present bus for the next seven years. Whether the present bus is used or a new bus is purchased, the bus would be traded in for another bus at the end of seven years. The University uses a discount rate of 12% and the total cost approach to net present value analysis.

- If the new bus is purchased, the present value of the annual cash operating costs associated with this alternative is closest to:

A) \$(54,800)
B) \$(36,500)
 C) \$(16,200)
 D) \$(42,800)

- If the present bus is repaired, the present value of the annual cash operating costs associated with this alternative is closest to:

A) \$(36,500)
 B) \$(16,200)
 C) \$(47,200)
D) \$(54,800)

- If the present bus is repaired, the present value of the salvage received on sale of the bus seven years from now is closest to:

A) \$(2,260)
 B) \$2,260
C) \$904
 D) \$(904)

8) Westland College has a telephone system that is in poor condition. The system either can be overhauled or replaced with a new system. The following data have been gathered concerning these two alternatives (Ignore income taxes.):

	Present System	Proposed New System
Purchase cost new	\$ 250,000	\$ 300,000
Accumulated depreciation	\$ 240,000	-
Overhaul costs needed now	\$ 230,000	-
Annual cash operating costs	\$ 180,000	\$ 170,000
Salvage value now	\$ 160,000	-
Salvage value at the end of 8 years	\$ 152,000	\$ 165,000
Working capital required	-	\$ 200,000

Westland College uses a 10% discount rate and the total cost approach to capital budgeting analysis. Both alternatives are expected to have a useful life of eight years.

- The net present value of the alternative of overhauling the present system is closest to:
 - A) \$(1,279,316)
 - B) \$(1,119,316)**
 - C) \$801,284
 - D) \$(1,194,036)
- The net present value of the alternative of purchasing the new system is closest to:
 - A) \$(1,076,495)
 - B) \$(1,236,495)**
 - C) \$(1,169,895)
 - D) \$(969,895)

9) Paragas, Inc., is considering the purchase of a machine that would cost \$370,000 and would last for 8 years. At the end of 8 years, the machine would have a salvage value of \$52,000. The machine would reduce labor and other costs by \$96,000 per year. Additional working capital of \$4,000 would be needed immediately. All of this working capital would be recovered at the end of the life of the machine. The company requires a minimum pretax return of 19% on all investment projects.

- The combined present value of the working capital needed at the beginning of the project and the working capital released at the end of the project is closest to:
 - A) \$(3,004)**
 - B) \$0
 - C) \$(12,080)
 - D) \$11,816
- The net present value of the proposed project is closest to:
 - A) \$9,584
 - B) \$78,530
 - C) \$22,532
 - D) \$19,528**

10) Almdarez Corporation is considering the purchase of a machine that would cost \$320,000 and would last for 7 years. At the end of 7 years, the machine would have a salvage value of \$51,000. By reducing labor and other operating costs, the machine would provide annual cost savings of \$72,000. The company requires a minimum pretax return of 18% on all investment projects. (Ignore income taxes.)

- The present value of the annual cost savings of \$72,000 is closest to:
A) \$22,608
B) \$874,298
C) \$504,000
D) \$274,464

- The net present value of the proposed project is closest to:
A) \$(29,522)
B) \$(45,536)
C) \$5,464
D) \$(94,042)

11THE INTERNAL RATE OF RETURN METHOD

IRR: The rate of return of an investment project over its useful life.

Factor of the internal rate of return = investment required / annual net cash inflow

Glendale school district is considering the purchase of a large tractor-pulled lawn mower. At present, the lawn is mowed using a small hand-pushed gas mower. The large, tractor-pulled mower will cost \$16,950 and will have a useful life of 10 years. It will have a negligible scrap value, which can be ignored. The tractor-pulled mower would do the job faster than the old mower, resulting in labor savings of \$ 3,000 per year.

Compute the internal rate of return.

Comparison between net present value and internal rate of return methods

First: both methods use the cost of capital to screen out undesirable investment projects.

-In IRR if it is not too high to cover the cost of capital the project is ordinary rejected.

-In NPV the cost of capital is used as a discounted rate, any project with negative NPV is rejected

Second: the NPV method is simpler to use than IRR particularly when a project doesn't have identical cash flows every year.

Third: both methods assume that the cash flows generated by a project during its useful life are immediately reinvested elsewhere.

-The NPV assumes the rate of return is the discount rate

-the internal rate of return assumes the rate of return earned on cash flows is the internal rate of return on the project.

1	If the internal rate of return is less than the required rate of return for a project, then the net present value of that project is positive.	FALSE
2	The internal rate of return is the rate of return of an investment project over its useful life.	TRUE
3	The internal rate of return is computed by finding the discount rate that equates the present value of a project's cash outflows with the present value of its cash inflows.	TRUE
4	The internal rate of return method assumes that the cash flows generated by the project are immediately reinvested elsewhere at a rate of return that equals the company's cost of capital.	FALSE

1) The internal rate of return method assumes that a project's cash flows are reinvested at the:

- A) **internal rate of return.**
- B) simple rate of return.
- C) required rate of return.
- D) payback rate of return.

2) Ataxia Fitness Center is considering an investment in some additional weight training equipment. The equipment has an estimated useful life of 10 years with no salvage value at the end of the 10 years. Ataxia's internal rate of return on this equipment is 8%. Ataxia's discount rate is also 8%. The payback period on this equipment is closest to (Ignore income taxes.):

determine the appropriate discount factor(s) using the tables provided.

- A) 10 years
- B) **6.71 years**
- C) 5 years
- D) 7.81 years

3) Congener Beverage Corporation is considering an investment in a project that has an internal rate of return of 20%. The only cash outflow for this project is the initial investment. The project is estimated to have an 8 year life and no salvage value. Cash inflows from this project are expected to be \$100,000 per year in each of the 8 years. Congener's discount rate is 16%. What is the net present value of this project?

determine the appropriate discount factor(s) using the tables provided.

- A) \$5,215
- B) \$15,464
- C) **\$50,700**
- D) \$55,831

12

1) Boxtton Corporation's required rate of return is 12%. The company is considering the purchase of a new machine that will save \$20,000 per year in cash operating costs. The machine will cost \$128,360 and will have a 10-year useful life with zero salvage value. Straight-line depreciation will be used. (Ignore income taxes.)

Required:

Compute the machine's internal rate of return. Would you recommend purchase of the machine?

2) HI Corporation is considering the purchase of a machine that promises to reduce operating costs by the same amount for every year of its 5-year useful life. The machine will cost \$205,980 and has no salvage value. The machine has a 14% internal rate of return. (Ignore income taxes.)

Required:

What are the annual cost savings promised by the machine?

1) Heap Corporation is considering an investment in a project that will have a two year life. The project will provide a 10% internal rate of return, and is expected to have a \$40,000 cash inflow the first year and a \$50,000 cash inflow in the second year. What investment is required in the project? (Ignore income taxes.)

- A) \$74,340
- B) \$77,660**
- C) \$81,810
- D) \$90,000

2) Bau Long-Haul, Inc. is considering the purchase of a tractor-trailer that would cost \$281,656, would have a useful life of 7 years, and would have no salvage value. The tractor-trailer would be used in the company's hauling business, resulting in additional net cash inflows of \$76,000 per year. The internal rate of return on the investment in the tractor-trailer is closest to (Ignore income taxes.):

- A) 19%**
- B) 18%
- C) 21%
- D) 16%

3) Welch Corporation is planning an investment with the following characteristics :

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

The initial cost of the equipment is closest to:

- A) \$157,410**
- B) \$175,005
- C) \$235,890
- D) Cannot be determined from the given information.

4) Laws Corporation is considering the purchase of a machine costing \$16,000. Estimated cash savings from using the new machine are \$4,120 per year. The machine will have no salvage value at the end of its useful life of six years and the required rate of return for Laws Corporation is 12%. The machine's internal rate of return is closest to (Ignore income taxes.):

- A) 12%
- B) 14%**
- C) 16%
- D) 18%

5) Given the following data (Ignore income taxes.):

Cost of equipment	\$ 48,680
Annual cash inflows	\$ 10,000
Internal rate of return	10 %

The life of the equipment must be:

- A) it is impossible to determine from the data given
- B) 5 years
- C) 6 years
- D) 7 years**

13**Uncertain cash flows**

A company with a % 12 discount rate is considering purchasing automated equipment that would have a 10-year useful life. Also suppose that discounted cash flow analysis of just the tangible cost and benefits shows a negative net present value of \$ 226,000. Clearly, if the intangible benefits are large enough, they could turn this negative net present value into a positive net present value. In this case, the amount of additional cash flow per year from the intangible benefits that would be needed to make the project financially attractive can be computed as follows:

Preference decisions – The ranking of investment projects

preference decisions = rationing decisions = ranking decisions

IRR >> higher rate

NPV >> comparing the initial investment too

1	When the net cash inflow is the same every year for a project after the initial investment, the internal rate of return of a project can be determined by dividing the initial investment required in the project by the annual net cash inflow. This computation yields a factor that can be looked up in a table of present values of annuities to find the internal rate of return.	TRUE
2	An increase in the expected salvage value at the end of a capital budgeting project will increase the internal rate of return for that project.	TRUE
3	The minimum required rate of return is the discount rate that makes the net present value of the project equal to zero.	FALSE
4	The salvage value of new equipment should not be considered when using the internal rate of return method to evaluate a project.	FALSE
5	Neither the net present value method nor the internal rate of return method can be used as a screening tool in capital budgeting decisions.	FALSE
6	If the salvage value of equipment at the end of a project is highly uncertain, the salvage value should be ignored in capital budgeting decisions.	FALSE

1) A preference decision in capital budgeting:

A) is concerned with whether a project clears the minimum required rate of return hurdle.

B) comes before the screening decision.

C) is concerned with determining which of several acceptable alternatives is best.

D) involves using market research to determine customers' preferences.

2) Highpoint, Inc. is considering investing in automated equipment with a ten-year useful life. Managers at Highpoint have estimated the cash flows associated with the tangible costs and benefits of automation, but have been unable to estimate the cash flows associated with the intangible benefits. Using the company's 12% required rate of return, the net present value of the cash flows associated with just the tangible costs and benefits is a negative \$282,500. How large would the annual net cash inflows from the intangible benefits have to be to make this a financially acceptable investment? (Ignore income taxes.)

A) \$20,000

B) \$28,250

C) \$35,000

D) \$50,000

14

Devon Corporation uses a discount rate of 8% in its capital budgeting. Partial analysis of an investment in automated equipment with a useful life of 8 years has thus far yielded a net present value of -\$496,541. This analysis did not include any estimates of the intangible benefits of automating this process nor did it include any estimate of the salvage value of the equipment.

Required:

a. Ignoring any salvage value, how large would the additional cash flow per year from the intangible benefits have to be to make the investment in the automated equipment financially attractive?

15

The management of an amusement park is considering purchasing a new ride for \$80,000 that would have a useful life of 10 years and a salvage value of \$10,000. The ride would require annual operating costs of \$32,000 throughout its useful life. The company's discount rate is 9%. Management is unsure about how much additional ticket revenue the new ride would generate-particularly since customers pay a flat fee when they enter the park that entitles them to unlimited rides. Hopefully, the presence of the ride would attract new customers. (Ignore income taxes.)

Required:

How much additional revenue would the ride have to generate per year to make it an attractive investment?

1) Croce, Inc., is investigating an investment in equipment that would have a useful life of 7 years. The company uses a discount rate of 8% in its capital budgeting. The net present value of the investment, excluding the salvage value, is $-\$515,967$. To the nearest whole dollar how large would the salvage value of the equipment have to be to make the investment in the equipment financially attractive? (Ignore income taxes.)

- A) \$41,277
- B) \$885,021**
- C) \$515,967
- D) \$6,449,588

2) Jojola Corporation is investigating buying a small used aircraft for the use of its executives. The aircraft would have a useful life of 5 years. The company uses a discount rate of 13% in its capital budgeting. The net present value of the initial investment and the annual operating cash cost is $-\$439,238$. Management is having difficulty estimating the annual benefit of having the aircraft and estimating the salvage value of the aircraft. (Ignore income taxes.)

Ignoring the annual benefit, to the nearest whole dollar how large would the salvage value of the aircraft have to be to make the investment in the aircraft financially attractive?

- A) \$57,101
- B) \$439,238
- C) \$3,378,754
- D) \$808,910**

Ignoring any salvage value, to the nearest whole dollar how large would the annual benefit have to be to make the investment in the aircraft financially attractive?

- A) \$439,238
- B) \$124,890**
- C) \$87,848
- D) \$57,101

3) Treads Corporation is considering the purchase of a new machine to replace an old machine that is currently being used. The old machine is fully depreciated but can be used by the corporation for five more years. If Treads decides to buy the new machine, the old machine can be sold for $\$60,000$. The old machine would have no salvage value in five years.

The new machine would be purchased for $\$1,000,000$ in cash. The new machine has an expected useful life of five years with no salvage value. Due to the increased efficiency of the new machine, the company would benefit from annual cash savings of $\$300,000$.

Treads Corporation uses a discount rate of 12%. (Ignore income taxes.)

The internal rate of return of the project is closest to:

- A) 14%
- B) 16%
- C) 18%**
- D) 20%

16

Project Profitability Index

Net present value of the project / investment required

	Investment	
	A	B
Investment required	\$ (1000)	\$ (5000)
Present value of cash flows	11,000	6,000
Net present value	\$ 1000	\$ 1000
Project profitability index		

The management of Winstead Corporation is considering the following three investment projects (Ignore income taxes.):

	Project Q	Project R	Project S
Investment required	14,000	48,000	74,000
Present value of cash inflows	14,140	54,720	82,140

The only cash outflows are the initial investments in the projects.

Required:

Rank the investment projects using the project profitability index.

	Project Q	Project R	Project S
Investment required	\$ (14,000)	\$ (48,000)	\$ (74,000)
Present value of cash inflows	14,140	54,720	82,140

1	An investment project with a project profitability index of 0.04 has an internal rate of return that is less than the discount rate.	FALSE
2	In preference decisions, the profitability index and internal rate of return methods will rank projects in the same order of preference.	FALSE
3	When the internal rate of return method is used to rank investment proposals, the higher the internal rate of return, the more desirable the investment.	TRUE
4	If investment funds are limited, the net present value of one project should not be compared directly to the net present value of another project unless the initial investments in these projects are equal.	TRUE
5	In calculating the "investment required" for the project profitability index, the amount invested should not be reduced by any salvage recovered from the sale of old equipment.	FALSE
6	When computing the project profitability index of an investment project, the investment required should exclude any investment made in working capital at the beginning of the project.	FALSE

1) Perkins Corporation is considering several investment proposals, as shown below:

	Investment Proposal			
	A	B	C	D
Investment required	\$ 80,000	\$ 100,000	\$ 60,000	\$ 75,000
Present value of future net cash flows	96,000	\$ 150,000	\$ 84,000	\$ 120,000

If the project profitability index is used, the ranking of the projects from most to least profitable would be:

- A) **D, B, C, A**
 B) B, D, C, A
 C) B, D, A, C
 D) A, C, B, D

2) Ryner Corporation is considering three investment projects: S, T, and U. Project S would require an investment of \$20,000, Project T of \$69,000, and Project U of \$83,000. No other cash outflows would be involved. The present value of the cash inflows would be \$23,200 for Project S, \$77,970 for Project T, and \$94,620 for Project U. Rank the projects according to the profitability index, from most profitable to least profitable. (Ignore income taxes.)

- A) U, T, S
 B) T, S, U
 C) U, S, T
 D) **S, U, T**

3) Trovato Corporation is considering a project that would require an investment of \$48,000. No other cash outflows would be involved. The present value of the cash inflows would be \$51,840. The profitability index of the project is closest to (Ignore income taxes.):

- A) 0.07
- B) 0.08**
- C) 0.92
- D) 1.08

4) A project has an initial investment of \$100,000 and a project profitability index of 0.15. The discount rate is 12%. The net present value of the project is closest to:

- A) \$15,000**
- B) \$115,000
- C) \$112,000
- D) \$12,000

5) A project requires an initial investment of \$200,000 and has a project profitability index of 0.250. The present value of the future cash inflows from this investment is:

- A) \$50,000
- B) \$25,000
- C) \$250,000**
- D) \$225,000

6) A company is pondering an investment project that has an internal rate of return which is equal to the company's discount rate. The project profitability index of this investment project is:

- A) 0.0**
- B) 0.5
- C) 1.0
- D) 1.5

7) The management of Hibert Corporation is considering three investment projects-W, X, and Y. Project W would require an investment of \$21,000, Project X of \$66,000, and Project Y of \$95,000. The present value of the cash inflows would be \$22,470 for Project W, \$73,920 for Project X, and \$98,800 for Project Y. (Ignore income taxes.)

The profitability index of investment project X is closest to:

- A) 0.11
- B) 0.88
- C) 1.12
- D) 0.12**

17**The simple rate of return method**

Simple rate of return = accounting rate of return = unadjusted rate of return

$$\text{Simple rate of return} = \frac{\text{annual incremental net operating income}}{\text{initial investment}}$$

Annual incremental net operating income = revenues – depreciation exp – net cash exp

initial investment = cost of the investment – salvage value

Limitations of simple rate of return method:

- 1-it focuses on accounting net operating income rather than cash flows.
- 2-it doesn't involve discounting cash flows

Postaudit: involves checking whether or not expected results are actually realized.

Brigham Tea, Inc., is a processor of low-acid tea. The company is contemplating purchasing equipment for an additional processing line that would increase revenues by \$ 90,000 per year. Incremental cash operating expense would be \$ 40,000 per year, the equipment would cost \$ 180,000 and have a nine-year life with no salvage value.

Calculate the simple rate of return

Midwest farms, Inc., hires people on a part time basis to sort eggs. The cost of hand sorting is \$ 30,000 per year. The company is investigating an egg-sorting machine that would cost \$ 90,000 and have a 15-year useful life. The machine would have negligible salvage value, and it would cost \$ 10,000 per year to operate and maintain. The egg-sorting equipment currently being used could be sold now for a scrap value of \$ 2,500.

Calculate the simple rate of return

1	The simple rate of return focuses on cash flows rather than on accounting net operating income.	FALSE
2	The simple rate of return is computed by dividing the annual net operating income generated by a project by the initial investment in the project.	TRUE

1- Jark Corporation has invested in a machine that cost \$60,000, that has a useful life of six years, and that has no salvage value at the end of its useful life. The machine is being depreciated by the straight-line method, based on its useful life. It will have a payback period of four years. Given these data, the simple rate of return on the machine is closest to (Ignore income taxes.):

- A) **8.3%**
- B) 7.2%
- C) 9.5%
- D) 25%

2- The management of Plotnik Corporation is investigating purchasing equipment that would increase sales revenues by \$269,000 per year and cash operating expenses by \$156,000 per year. The equipment would cost \$294,000 and have a 6 year life with no salvage value. The simple rate of return on the investment is closest to (Ignore income taxes.):

- A) 16.7%
- B) 38.4%
- C) 23.8%
- D) **21.8%**

3-) A company is considering buying a machine that costs \$500,000, has a useful life of ten years, and is depreciated over its useful life by the straight-line method. The salvage value of the machine at the end of ten years will be \$40,000. This machine will replace an old machine that is fully depreciated; the old machine has a salvage value of \$75,000 now. If the simple rate of return of this investment is 12.7%, then the anticipated annual incremental net operating income from this machine for each of the next ten years is (Ignore income taxes.):

- A) \$100,000
- B) \$63,825
- C) **\$53,975**
- D) \$46,380

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terminate and the equipment would have no salvage value. The project would provide net operating income each year as follows (Ignore income taxes.):

Sales		\$ 2,000,000
Variable expenses		<u>1,400,000</u>
Contribution margin		600,000
Fixed expenses:		
Fixed out-of-pocket cash expenses	\$ 300,000	
Depreciation	<u>100,000</u>	<u>400,000</u>
Net operating income		<u>\$ 200,000</u>

All of the above items, except for depreciation, represent cash flows. The company's required rate of return is 12%.

Required:

a. Compute the project's net present value.

Because depreciation is the only noncash item on the income statement, the annual net cash flow can be computed by adding back depreciation to net operating income.

Net operating income	\$ 200,000
Depreciation	<u>100,000</u>
Annual net cash inflow	<u>\$ 300,000</u>

	Now	Year <u>1-10</u>
Initial investment	\$ (1,000,000)	
Annual net cash flow		<u>\$ 300,000</u>
Total cash flows (a)	\$ (1,000,000)	\$ 300,000
Discount factor (12%) (b)	1.000	5.650
Present value of cash flows (a) × (b)	\$ (1,000,000)	\$ 1,695,000
Net present value	\$ 695,000	

b. Compute the project's internal rate of return to the nearest whole percent.

The formula for computing the factor of the internal rate of return (IRR) is:

Factor of the IRR = Investment required ÷ Annual net cash inflow

$$= \$1,000,000 \div \$300,000 = 3.333$$

This factor is closest to the present value of an annuity over 10 years at 27%.

Therefore, to the nearest whole percent, the internal rate of return is 27%.

c. Compute the project's payback period.

The formula for the payback period is:

Investment required ÷ Annual net cash inflow = Payback period

$$\$1,000,000 \div \$300,000 \text{ per year} = 3.33 \text{ years}$$

d. Compute the project's simple rate of return.

The formula for the simple rate of return is:

Simple rate of return = Net operating income ÷ Initial investment

$$= \$200,000 \div \$1,000,000 = 20.0\%$$

1-Joetz Corporation has gathered the following data on a proposed investment project (Ignore income taxes.):

Investment required in equipment	\$ 30,000
Annual cash inflows	\$ 6,000 per year
Salvage value of equipment	\$ 0
Life of the investment	15 years
Required rate of return	10%

The company uses straight-line depreciation on all equipment. Assume cash flows occur uniformly throughout a year except for the initial investment.

The payback period for the investment is:

- A) **5 years**
- B) 15 years
- C) 2 years
- D) 7.143 years

The simple rate of return for the investment (rounded to the nearest tenth of a percent) is:

- A) 20.0%
- B) **13.3%**
- C) 18.0%
- D) 10.0%

The net present value of the investment is:

- A) **\$15,636**
- B) \$24,000
- C) \$45,636
- D) \$60,000

The internal rate of return of the investment is closest to:

- A) 16%
- B) **18%**
- C) 20%
- D) 22%

2- Denny Corporation is considering replacing a technologically obsolete machine with a new state-of-the-art numerically controlled machine. The new machine would cost \$450,000 and would have a ten-year useful life. Unfortunately, the new machine would have no salvage value. The new machine would cost \$20,000 per year to operate and maintain, but would save \$100,000 per year in labor and other costs. The old machine can be sold now for scrap for \$50,000. The simple rate of return on the new machine is closest to (Ignore income taxes.):

- A) **8.75%**
- B) 20.00%
- C) 7.78%
- D) 22.22%

3-Oriental Corporation has gathered the following data on a proposed investment project:

Investment in depreciable equipment	\$ 200,000
Annual net cash flows	\$ 50,000
Life of the equipment	10 years
Salvage value	\$ 0
Discount rate	10%

The company uses straight-line depreciation on all equipment. Assume cash flows occur uniformly throughout a year except for the initial investment.

The payback period for the investment would be:

- A) 2.41 years
- B) 0.25 years
- C) 10 years
- D) 4 years**

The simple rate of return on the investment would be:

- A) 10%
- B) 35%
- C) 15%**
- D) 25%

The net present value of this investment would be:

- A) \$(14,350)
- B) \$107,250**
- C) \$77,200
- D) \$200,000

4- Fast Food, Inc., has purchased a new donut maker. It cost \$16,000 and has an estimated life of 10 years. The following annual donut sales and expenses are projected (Ignore income taxes.):

Sales		\$ 22,000
Expenses:		
Flour, etc., required in making donuts	\$ 10,000	
Salaries	\$ 6,000	
Depreciation	\$ 1,600	17,600
Net operating income		<u>\$ 4,400</u>

Assume cash flows occur uniformly throughout a year except for the initial investment.

The payback period on the new machine is closest to:

- A) 5 years
- B) 2.7 years**
- C) 3.6 years
- D) 1.4 years

The simple rate of return for the new machine is closest to:

- A) 20%
- B) 37.5%
- C) 27.5%**
- D) 80.0%

مبروك للطلبة **مو** متخصصين محاسبة انتهاء آخر مواد المحاسبة و ان شاء الله التخصص كان خفيف عليكم و نتمنى إن ما صار بينكم و بين التخصص أي عداوة

طلبة المحاسبة الكرام
القادم أعظم إن شاء الله



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THE END

Good luck

TABLE 2 Present value interest factor of \$1 per period at i% for n periods, PVIF(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Present Value of Annuity of \$1													
Periods	1%	2%	3%	4%	5%	6%	8%	10%	12%	14%	16%	18%	20%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.926	0.909	0.893	0.877	0.862	0.847	0.833
2	1.970	1.942	1.913	1.886	1.859	1.833	1.783	1.736	1.690	1.647	1.605	1.566	1.528
3	2.941	2.884	2.829	2.775	2.723	2.673	2.577	2.487	2.402	2.322	2.246	2.174	2.106
4	3.902	3.808	3.717	3.630	3.546	3.465	3.312	3.170	3.037	2.914	2.798	2.690	2.589
5	4.853	4.713	4.580	4.452	4.329	4.212	3.993	3.791	3.605	3.433	3.274	3.127	2.991
6	5.795	5.601	5.417	5.242	5.076	4.917	4.623	4.355	4.111	3.889	3.685	3.498	3.326
7	6.728	6.472	6.230	6.002	5.786	5.582	5.206	4.868	4.564	4.288	4.039	3.812	3.605
8	7.652	7.325	7.020	6.733	6.463	6.210	5.747	5.335	4.968	4.639	4.344	4.078	3.837
9	8.566	8.162	7.786	7.435	7.108	6.802	6.247	5.759	5.328	4.946	4.607	4.303	4.031
10	9.471	8.983	8.530	8.111	7.722	7.360	6.710	6.145	5.650	5.216	4.833	4.494	4.192
11	10.368	9.787	9.253	8.760	8.306	7.887	7.139	6.495	5.938	5.453	5.029	4.656	4.327
12	11.255	10.575	9.954	9.385	8.863	8.384	7.536	6.814	6.194	5.660	5.197	4.793	4.439
13	12.134	11.348	10.635	9.986	9.394	8.853	7.904	7.103	6.424	5.842	5.342	4.910	4.533
14	13.004	12.106	11.296	10.563	9.899	9.295	8.244	7.367	6.628	6.002	5.468	5.008	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	8.559	7.606	6.811	6.142	5.575	5.092	4.675
20	18.046	16.351	14.877	13.590	12.462	11.470	9.818	8.514	7.469	6.623	5.929	5.353	4.870
25	22.023	19.523	17.413	15.622	14.094	12.783	10.675	9.077	7.843	6.873	6.097	5.467	4.948
30	25.808	22.396	19.600	17.292	15.372	13.765	11.258	9.427	8.055	7.003	6.177	5.517	4.979
40	32.835	27.355	23.115	19.793	17.159	15.046	11.925	9.779	8.244	7.105	6.233	5.548	4.997