

SOLUTION - EXERCISES SECTION 5

1. Redmond Company is considering investing in one of the following two projects:

	Annual Cash Inflows	
Year	<u>Project A</u>	<u>Project B</u>
1	\$ 2,000	\$ 4,000
2	3,000	2,000
3	3,000	2,000
4	<u>1,000</u>	<u>1,000</u>
Total	<u>\$ 9,000</u>	<u>\$ 9,000</u>

Required:

- 1) Which project is more desirable strictly in terms of cash inflows? Why?
- 2) Compute the present value of each project's cash inflows assuming the company's required rate of return is 12%.
- 3) What is the maximum amount Redmond should be willing to pay for each project?
- 4) Suppose each project costs \$7,000. Which project(s) should be accepted? Note that only one project can be accepted.

Feedback:

- 1) Project B is more desirable because the majority of the cash flows occur earlier. The timing of the cash flows is important because of the concept of the time value of money which recognizes the fact that the present value of a dollar received in the future is worth less than a dollar.
- 2) Present values:

	12%			12%		
<u>Project A</u>	<u>PVIF</u>	<u>Total PV</u>		<u>Project B</u>	<u>PVIF</u>	<u>Total PV</u>
\$ 2,000	0.892857	\$ 1,785.71		\$ 4,000	0.892857	\$ 3,571.43
3,000	0.797194	2,391.58		2,000	0.797194	1,594.39
3,000	0.711780	2,135.34		2,000	0.711780	1,423.56
<u>1,000</u>	0.635518	<u>635.52</u>		<u>1,000</u>	0.635518	<u>635.52</u>
\$ 9,000		\$ 6,948.15		\$ 9,000		\$ 7,224.89

- 3) Maximum that should be paid: Project A = \$6,948.15; Project B = \$7,224.89
- 4) Redmond should accept Project B because its NPV is positive, while Project A's is negative.

2. Chichester Company is considering investing in the following two mutually exclusive projects:

	Annual Cash Inflows	
Year	Project A	Project B
1	\$ 5,000	\$ 3,500
2	4,000	3,500
3	3,000	3,500
4	2,000	3,500
Total	\$ 14,000	\$ 14,000

Required:

- 1) Which project is more desirable strictly in terms of cash inflows? Why?
- 2) Compute the present value of each project's cash inflows assuming the company's required rate of return is 10%.
- 3) What is the maximum amount Chichester should be willing to pay for each project?
- 4) Suppose each project costs \$10,000. Which project(s) should be accepted?

Feedback:

1) Project A is more desirable because the majority of the cash flows occur earlier. The timing of the cash flows is important because of the concept of the time value of money which recognizes the fact that the present value of a dollar to be received in the future is worth less than a dollar.

2) Present values:

Project B: \$3,500 per year for four years $\times$ PV annuity factor for 10 percent (3.169865) = \$11,095.

		10%	
Year	Project A	PVIF	Total PV
1	\$ 5,000	0.90909	\$ 4,545.45
2	4,000	0.82645	3,305.80
3	3,000	0.75131	2,253.93
4	2,000	0.68301	1,366.02
Total	\$ 14,000		\$ 11,471.20

3) Maximum that should be paid: Project A = \$11,471; Project B = \$11,095.

4) Both Project A and Project B have a positive net present value. If possible, Chichester should accept both projects. If resources are only available for one project, the company should select Project A.

3. Neighbors Company is considering the purchase of new equipment that will cost \$130,000. The equipment will save the company \$38,000 per year in cash operating costs. The equipment has an estimated useful life of five years and a zero expected salvage value. The company's cost of capital is 10%.

Required:

- 1) Ignoring income taxes, compute the net present value and internal rate of return. Round net present value to the nearest dollar and round internal rate of return to the nearest whole percent.
- 2) Should the equipment be purchased? Why or why not?

Feedback:

- 1) Ignoring income taxes:

Total present value = $\$38,000 \times 3.790787 =$	\$ 144,050
Less: Initial outlay	\$ (130,000)
Net Present Value	\$ 14,050

Present value factor for internal rate of return = $\$130,000 / \$38,000 = 3.421$. Looking up this interest factor in the present value of an annuity of \$1 table, 5 periods, the internal rate of return is slightly greater than 14%.

- 2) The equipment should be purchased. Net present value is positive, and the internal rate of return is higher than the required rate of return.

4. Pierce Company is considering the purchase of new equipment that will cost \$150,000. The equipment will save the company \$48,000 per year in cash operating costs. The equipment has an estimated useful life of five years and no expected salvage value. The company's cost of capital is 12%.

Required:

- 1) Assuming the company is subject to a 40% tax rate, compute the net present value.
- 2) Compute the amount of the annual depreciation tax shield provided by the new equipment.
- 3) Should the equipment be purchased? Why or why not?

Answers will vary

Feedback: 1) Annual cash taxable income = $\$48,000 - \$30,000$ depreciation = \$18,000

Annual income tax = $\$18,000 \times 0.40 = \$7,200$

Income after taxes = $\$18,000 - \$7,200 = \$10,800$

Annual net cash inflow = $\$10,800 + \$30,000 = \$40,800$

Net present value = $(\$40,800 \times 3.604776) - 150,000 = \underline{\underline{\$(2,925)}}$

2) Annual depreciation tax shield = $\$30,000 \times 0.40 = \underline{\underline{\$12,000}}$

3) Because net present value is negative, the project is unacceptable.

5. Montana Company is evaluating two different capital investments, Project X and Y. Either X or Y would cost \$210,000, and the company cannot afford to do both. The company expects that Project X would provide net cash inflows of \$62,000 per year for 5 years. For Project Y, the net cash inflows are expected to be as follows:

Year	Cash inflows from Project Y
1	\$ 44,000
2	48,000
3	60,000
4	76,000
5	80,000
Total	\$ 308,000

Montana's cost of capital is 12%.

Required:

- 1) Calculate the present value index for Project X and for Project Y. Round your answer to three decimal places.
- 2) Indicate whether each of the projects is an acceptable investment.
- 3) Based on present value index, which of the two projects should Montana implement?

Answers will vary

Feedback: 1) Present value index for X: $\$62,000 \times 3.604776 / \$210,000 = 1.064$

Present value index for Y:

$[(\$44,000 \times 0.892857) + (\$48,000 \times 0.797194) + (\$60,000 \times 0.711780) + (\$76,000 \times 0.635518) + (\$80,000 \times 0.567427)] / \$210,000 = 1.019$

2) Both Project X and Project Y represent acceptable investments because the present value index is greater than 1 (net present value would be greater than zero for each).

3) Project X is preferred because the present value index is higher than for Y.