

BASIC CAPITAL BUDGETING

Rockyford Company must replace some machinery that has zero book value but a current market value of \$1,800. One possibility is to invest in new machinery costing \$40,000. This new machinery would produce estimated annual pretax operating cash savings of \$12,500. Assume the new machine will have a useful life of four years and depreciation of \$10,000 each year for book and tax purposes. It will have no salvage value at the end of four years. The investment in this new machinery would require an additional \$3,000 investment of working capital.

\$10,000
x 40%
tax rate

\$4,000
Tax
Shield

If Rockyford accepts this investment proposal, the disposal of the old machinery and the investment in the new one will occur on December 31 of this year. The cash flows from the investment will occur during the next four calendar years.

Rockyford is subject to a 40 percent income tax rate for all ordinary income and capital gains and has a 10 percent after-tax cost of capital. All operating and tax cash flows are assumed to occur at year-end.

Required -- Determine:

1. The present value of the after-tax cash flow arising from disposing of the old machinery. $(1800 - 0 \text{ BV}) = \$1800 \text{ Cap Gain} \times (1 - 40\% \text{ tax}) = \underline{\$1,080}$
2. The present value of the after-tax cash flows for the next four years attributable to the operating cash savings. $\$12,500 \times 60\% \times 3.17 = \underline{\$23,775}$
3. The present value of the tax shield effect of depreciation at the end of year 1. $(\$40,000 \div 4 \text{ yrs}) \times 40\% \text{ tax} \times 0.909 (\frac{1}{1+0.10}) = \underline{\$3,636}$
4. Which one of the following is the proper treatment for the \$3,000 working capital required in the current year?
 - a. It should be ignored in capital budgeting because it is not a capital investment.
 - b. It is a sunk cost that needs no consideration in capital budgeting.
 - c. It should be treated as part of the initial investment when determining the net present value.
 - d. It should be spread over the machinery's four-year life as a cash outflow in each of the years.
 - e. It should be included as part of the cost of the new machine and depreciated.

(CMA Adapted)

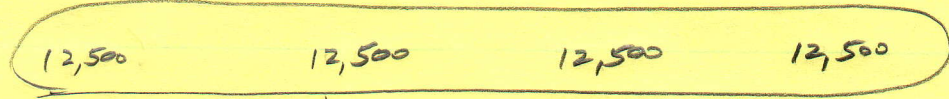
E 11-33

tax rate = 40%
 $i = 10\%$ hurdle rate.

12/31



(40,000)



(3000)

20,49

~~1800~~
1080

3000 $n=4$
 $i=10\%$
 $\times 0.683$

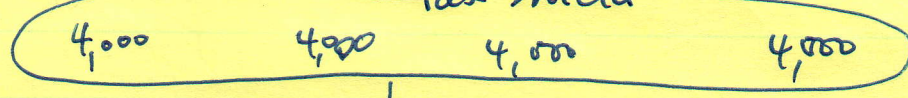
12,500
 $\times 60\%$ (100% - tax rate)

7,500

$\times 3.17$ $n=4$
 $i=10\%$

\$23,775

Tax Shield



12,680

$\times 3.17$

(3,416)

$i = 10\%$

Hurdle rate

Cost of Capital

CASH FLOW ANALYSIS AND NPV

Lou Lewis, the president of the Lewisville Company, has asked you to give him an analysis of the best use of a warehouse the company owns.

Foregone rent

Annuity $n=5$
 $i=14\%$

a. Lewisville Company is currently leasing the warehouse to another company for \$5,000 per month on a year-to-year basis.

all irrelevant

b. The warehouse's estimated sales value is \$200,000. A commercial Realtor believes that the price is likely to remain unchanged in the near future. The building originally cost \$60,000 and is being depreciated at \$1,500 annually. Its current net book value is \$7,500.

SL deprec. over 40 yrs
 $\$60,000 - (35 \text{ yrs} \times 1,500/\text{yr}) = \$7,500$ Book Value

c. Lewisville Company is seriously considering converting the warehouse into a factory outlet for furniture. The remodeling will cost \$100,000 and will be extremely modest because the major attraction will be rock-bottom prices. The remodeling will be depreciated over the next five years using the double-declining-balance method.

$BV \times (2 \times \frac{100\%}{5 \text{ Yrs}})$

PV @ 14%
PV of 5 lump sums

d. The inventory, cash, and receivables needed to open and sustain the factory outlet would be \$600,000. This total is fully recoverable when-ever operations terminate.

PV of 1/5 lump sum of \$600,000

Irrelevant

e. Lou is fairly certain the warehouse will be condemned in 10 years to make room for anew highway. The firm most likely would receive \$200,000 from the condemnation.

f. Estimated annual operating data, exclusive of depreciation, are:

Sales	\$900,000
Operation expenses	\$500,000

$400,000 \times 60\% = 240,000 \times [PV \text{ annuity } n=5; i=14\%]$

g. Nonrecurring sales promotion costs at the beginning of year 1 are expected to be \$100,000 (tax deductible)

$(100,000 \times 60\%) = 60,000$ already @ PV. Same as time 0

h. Nonrecurring termination costs at the end of year 5 are \$50,000. $\times 60\% \times [PV \text{ Lump Sum } n=5; i=14\%]$

i. The minimum annual rate of return desired is 14 percent. The company is in the 40 percent tax bracket.

The company saves $40\% \times \$100,000$ in taxes
so the remaining $60\% \times 100,000 = \$60,000$
is a negative cash outflow.

Show spread sheet.

Cash Flow Analysis and NPV

Complete the analysis form below for Lewisville Company to determine the best use of the warehouse.

Item	Description	PV Factor	PV	CASH FLOWS IN YEAR					
				0	1	2	3	4	5
a.	Foregone rent (\$5,000 x 12 x 0.6)	3.433	(\$123,588)		(\$36,000)	(\$36,000)	(\$36,000)	(\$36,000)	(\$36,000)
b.	All are irrelevant								
c.	Remodeling		(\$100,000)	(\$100,000)					
	Depreciation	0.877	\$14,032		\$16,000				
		0.769	\$7,382			\$9,600			
		0.675	\$3,888				\$5,760		
		0.592	\$2,557					\$4,320	
		0.519	\$2,242						\$4,320
d.	Investment in inventory & receivables		(\$600,000)	(\$600,000)					
	Recovery	0.519 #	\$311,400						\$600,000
e.	Irrelevant								
f.	Sales (\$900,000 x 0.6)	3.433	\$1,853,820		\$540,000	\$540,000	\$540,000	\$540,000	\$540,000
	Operating expenses (\$500,000 x 0.6)	3.433	(\$1,029,900)		(\$300,000)	(\$300,000)	(\$300,000)	(\$300,000)	(\$300,000)
			<u>\$823,920</u>						
g.	Sales promotion (\$100,000 x 0.6)		(\$60,000)	(\$60,000)					
h.	Termination (\$50,000 x 0.6)	0.519	(\$15,570)						(\$30,000)
	NPV		\$266,263						

> 0

> \$200,000 to sell warehouse.

DDB Depreciation
Schedule on back =>

$$DDB = BV \times 2 \left(\frac{1}{EUL} \right)$$

End of YR	(1) BV	40% x (1) Deprec Exp	40% Tax Shield
0	100,000	0	0
1	60,000	40,000 x 40% = 16,000	
2	36,000	40,000 x 40% = 24,000 24,000 x 40% = 9,600	
3	21,600	24,000 x 40% = 14,400 14,400 x 40% = 5,760	
4	10,800	10,800 x 40% = 4,320	Avg. 4,320
5	0	10,800 x 40% = 4,320	
	100,000		40,000
		10,800	4,320
		10,800	4,320

11-45 Cash Flow Analysis and NPV (15 min)

Item & Description	Factor	PV	CASH FLOWS IN YEAR (in '000)						
			0	1	2	3	4	5	
a. Foregone rent (\$5,000 x 12 x 0.6)	3.433	<\$123,588>	<100>	<36>	<36>	<36>	<36>	<36>	<36>
b. All are irrelevant									
c. Remodeling	0.877	< 100,000>							
Depreciation	0.769	14,032							
	0.675	7,382							
	0.592	3,888							
	0.519	2,557							
		2,242							
d. Investment in inventory and receivables	1.0	< 600,000>							
Recovery	0.519	311,400							
e. Irrelevant									
f. Sales (\$900 x 0.6)	3.433	1,853,820							
Operating expenses (\$500 x 0.6)	3.433	<1,029,900>							
g. Sales Promotion (\$100 x 0.6)		< 60,000>							
h. Termination (\$50 x 0.6)	0.519	< 15,570>							
NPV		\$266,263 > 0							

2. The positive net present value, \$266,263, suggests that, comparing to the leasing alternative it is financially advantageous to convert the facility into a factory outlet. The net present value from converting into the factory outlet is also better than the alternative of selling the warehouse for \$200,000.

MACHINE REPLACEMENT WITH TAX CONSIDERATIONS

A computer chip manufacturer spent $\$2,500,000$ to develop a special-purpose molding machine. The machine has been used for one year and will be obsolete after four years. The firm uses straight-line depreciation for this machine.

At the beginning of the second year, a machine salesperson offers anew, vastly more efficient machine. It will cost $\$2,000,000$, will reduce annual cash manufacturing costs from $\$1,800,000$ to $\$1,000,000$, and will have zero disposal value at the end of three years. Management has decided to use the double-declining-balance depreciation method for tax purposes if this machine is purchased.

The old machine's salvage value is $\$300,000$ now and will be $\$50,000$ three years from now; however, no salvage value is provided in calculating straight-line depreciation for tax purposes.

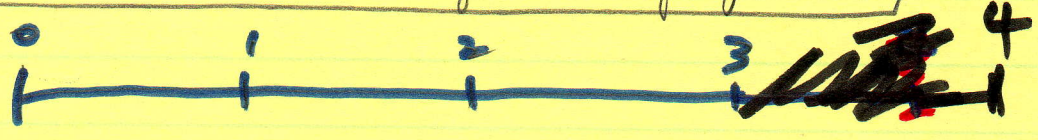
Required:

Assume that income tax rates are 45 percent. The minimum rate of return desired, after taxes, is 8 percent. Using the net present value technique, show whether the firm should purchase the new machine.

$$i = 8\%$$

P11-46

PV of Costs with the Original Equipment (000)



2,500,000
 ÷ 4 yrs
 625,000/yr.
 deprec.
 × 45%
 281,250 tax savings

281,250 281,250 281,250 281,250

724,781 ← × 2.577 (n=4, i=8%)

(990) (990) (990) (990)

(2,551,230)

1,800,000 operating costs

× (1-45%)
 (990,000)

21,835

50 ←

1,804,614

11-46 Machine Replacement with Tax Considerations (15 min)

Present Value of Costs with the Original Equipment

Present value of tax savings on depreciation:

$$\$2,500,000 \div 4 \times 0.45 \times 2.577 = \$724,781$$

Present value of operating costs:

$$\$1,800,000 \times (1 - 0.45) \times 2.577 = <2,551,230>$$

Present value of salvage value:

$$\$50,000 \times (1 - 0.45) \times 0.794 = \underline{21,835}$$

Present value of costs with the original equipment < \$1,804,614 >

Present value of the costs with the new machine

Initial outlay < \$2,000,000 >

Present value of tax savings on depreciation:

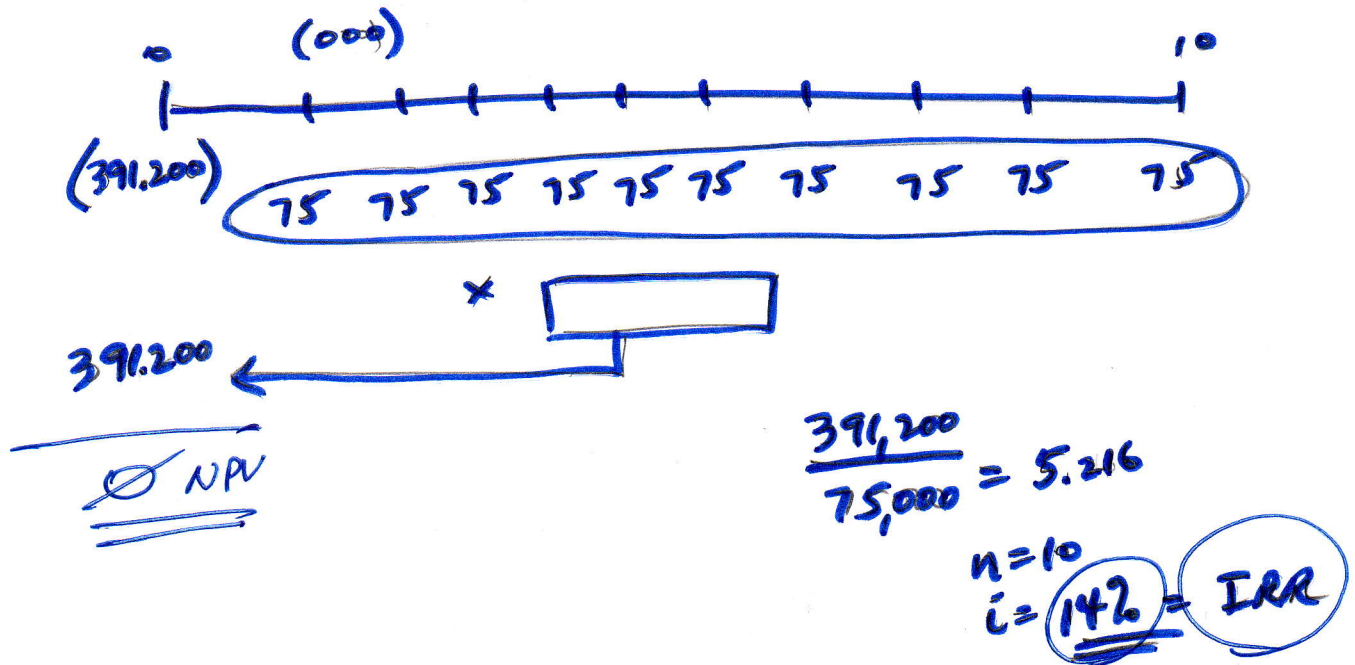
Year	Beginning Book Value	Depreciation Expense	Tax Rate	Tax Saving	Discount Factor	Present Value
1	\$2,000,000	\$1,333,333	x 0.45 =	\$600,000	x 0.926 =	\$ 555,600
2	666,667	444,445	x 0.45 =	200,000	x 0.857 =	171,400
3	222,223	222,223	x 0.45 =	100,000	x 0.794 =	79,400
Cash proceeds from sale of the old machine						300,000
Tax saving of loss on disposal of the old machine (\$1,875,000 - \$300,000) x 0.45 =						708,750
Present value of operating costs \$1,000,000 x (1 - .45) x 2.577 =						<1,471,350>
Total cost at present value						<u>< \$1,656,200 ></u>

Savings from using the new machine:

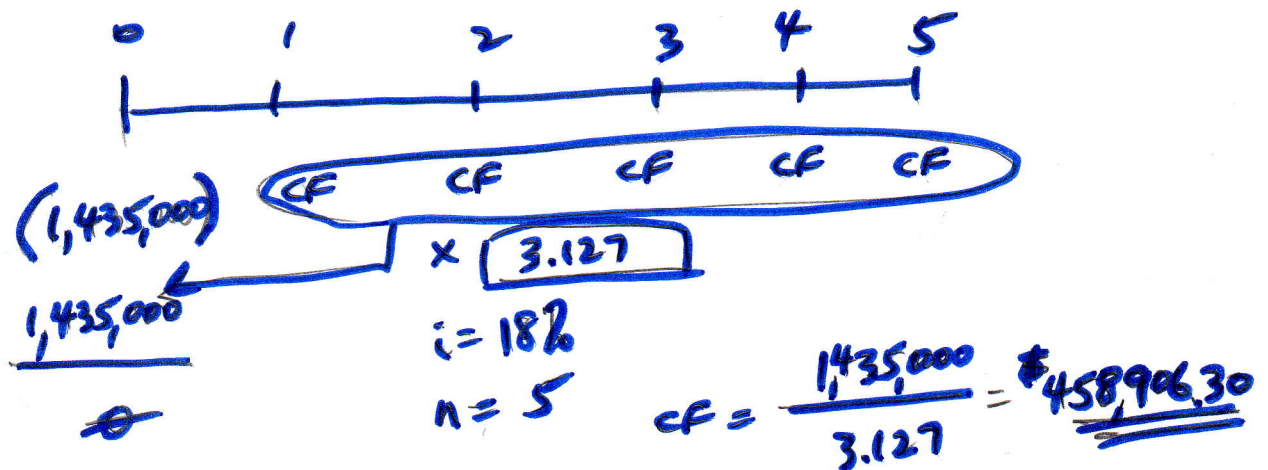
$$\$1,804,614 - \$1,656,200 = \$148,414$$

The total cost of the new machine, including the purchase cost and the operating cost in each of the three years, is \$148,414 below the total cost of continuing with the original equipment. Financially purchase of the new machine is a good investment.

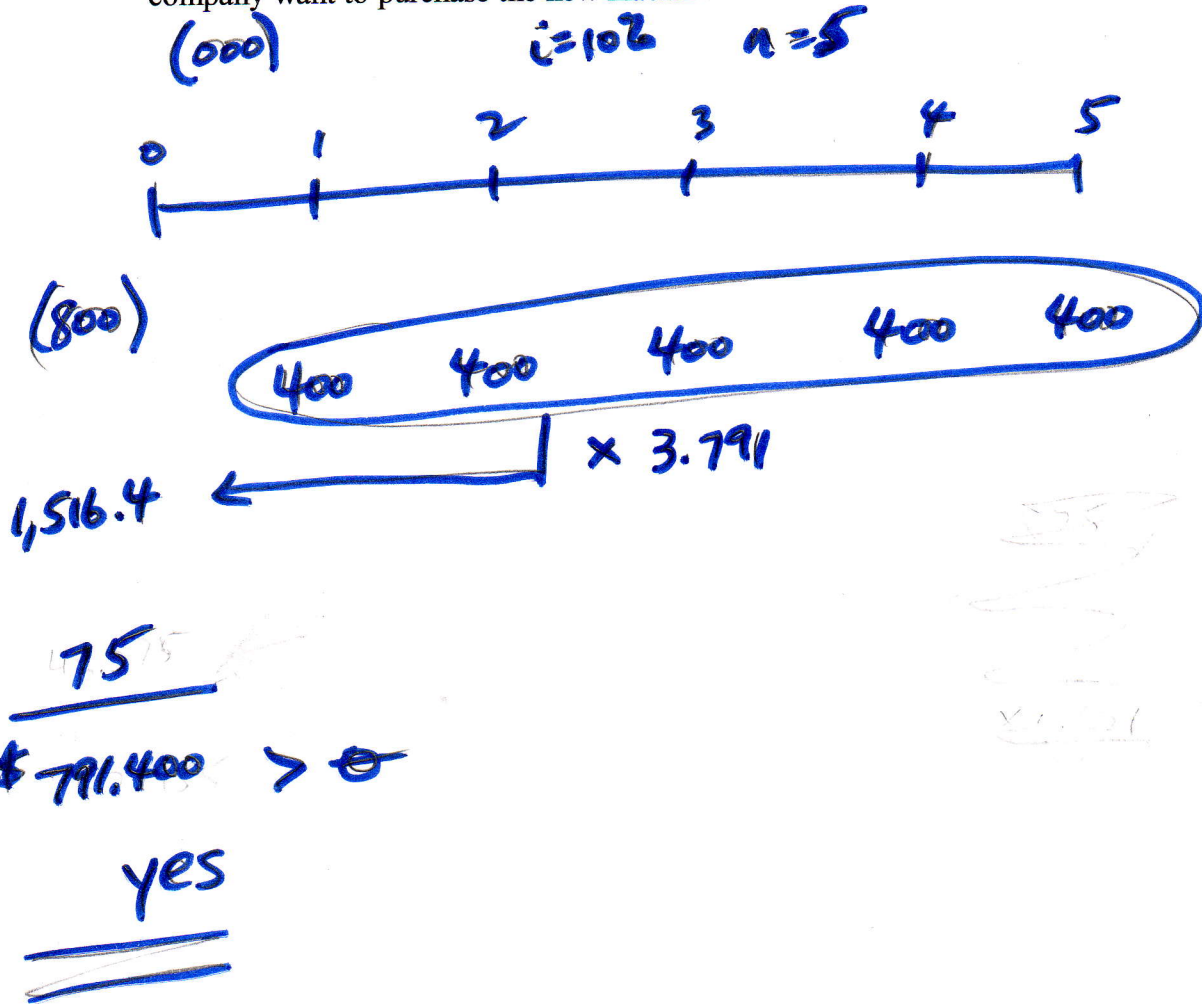
1. XYZ Manufacturing Company provides vending machines for soft-drink manufacturers. The company has been investigating a new piece of machinery for its production department. The old equipment has a remaining life of ten years and the new equipment has a value of \$391,200 with a ten-year life. The expected additional cash inflows are \$75,000 per year. What is the internal rate of return?



2. Investment A requires a net investment of \$1,435,000. The required rate of return is 18% for the five-year annuity. What are the annual cash inflows if the net present value equals 0? (rounded)



3. The ZZZ Corporation wants to purchase a new machine for its factory operations at a cost of \$800,000. The investment is expected to generate \$400,000 in annual cash flows for a period of five years. The required rate of return is 10%. The old machine can be sold for \$75,000. The machine is expected to have zero value at the end of the five-year period. What is the net present value of the investment? Would the company want to purchase the new machine? Income taxes are not considered.



4. The XXX Corporation wants to purchase a new machine for its factory operations at a cost of \$800,000. The investment is expected to generate \$400,000 in annual cash flows for a period of five years. The required rate of return is 10%. The old machine can be sold for \$75,000. The machine is expected to have zero value at the end of the five-year period. **Income taxes are considered. The new machine is depreciated under the straight-line method and the tax rate is 25%.**

What is the net present value of the investment?

Would the company want to purchase the new machine?

What is the approximate IRR of the investment?

(000) $i = 10\%$

	1	2	3	4	5
0	----- ----- ----- ----- -----				
(800)	400	400	400	400	400
	$\times 1 - 25\%$	$\times .75$	$\times .75$	$\times .75$	$\times .75$
	300	300	300	300	300
	$+ 40^*$	40	40	40	40
	340	340	340	340	340

$1,288.94 \leftarrow \times 3.791$

75

563,940

YES

* Annual Deprec.

$800 \div 5 = 160/\text{yr.}$

$\times 25\%$ tax rate

$+ 40$ cash tax benefit

Approx IRR - $\frac{(800-75)}{340} = 2.132 \quad n=5$

Yr	BV	Deprcc	Tax rate	Cash Benefit
1	800 x 40%	= 320	x .25	80
2	480 x 40%	= 192	x .25	48
3	288 x 40%	= 115.2	x .25	28.8
4	172.8 x 50%	= 86.4	x .25	21.6
5	x 50%	= 86.4	x .25	21.6

5. The DDB Corporation wants to purchase a new machine for its factory operations at a cost of \$800,000. The investment is expected to generate \$400,000 in annual cash flows for a period of five years. The required rate of return is 10%. The old machine can be sold for \$75,000. The machine is expected to have zero value at the end of the five-year period. **Income taxes are considered.** The new machine is depreciated under the **double-declining balance** method and the tax rate is 25%.

What is the net present value of the investment?

Would the company want to purchase the new machine?

What is the approximate IRR of the investment?

$$BV \times 2 \left(\frac{100\%}{EUL} \right)$$

$$\text{or } BV \times 40\%$$

$$i = 10\%$$

0	1	2	3	4	5
(800)					
	400	400	400	400	400
75	x .75	.75	.75	.75	.75
	<u>300</u>	<u>300</u>	<u>300</u>	<u>300</u>	<u>300</u>
	+ 80	+ 48	+ 28.8	+ 21.6	+ 21.6
	<u>380</u>	<u>348</u>	<u>328.8</u>	<u>321.6</u>	<u>321.6</u>
	x 0.909	x .826	.751	.683	x .621

$$1,299.1632 \leftarrow 345.42 + 287.448 + 246.9288 + 219.6528 + 199.7136$$

$$574.1632 > 0$$

yes

$$\text{IRR} = ?$$