CAPITAL BUDGETING
Seal-A-Deal, Inc.

Seal-A-Deal, Inc. is a company that specializes in negotiating contracts for professional athletes. The company handles labor contracts, deals involving advertising products, appearances at special events, and other types of contracts. The firm is considering the purchase of a new high-speed Xerox machine, which will make its operations more efficient.

As one of the financial managers of Seal-A-Deal, you have determined that the best machine for the job is a Xerox 3600 machine. The new machine will cost $43,588, require transportation of $800, and will also require $1,412 in working capital to support the new machine's operations. The machine will be depreciated over a 5-year period and will have a salvage value of $1,315 at the end of the expected economic life of six years. The company will not deduct the salvage value when calculating depreciation.

The new machine will replace an old Xerox machine that has seen its better days. The maintenance savings are expected to be as follows:

Year Number 1	$8,100
Year Number 2	7,800
Year Number 3	7,400
Year Number 4	7,000
Year Number 5	6,550
Year Number 6	6,200

The old machine can be sold for $8,300. It is now three years old and originally cost $36,000.

The firm has a hurdle rate of 6% for all potential projects and has a marginal tax rate of 34%.

a. Determine the depreciation associated with the new machine, for each year.

Depreciation on New Asset
(Depreciable Cost = $44,388)

	MACRS Value		*Depreciation*
Year 1	0.200	Year 1	$8,878
Year 2	0.320	Year 2	14,204
Year 3	0.192	Year 3	8,522
Year 4	0.115	Year 4	5,105
Year 5	0.115	Year 5	5,105
Year 6	0.058	Year 6	2,575

b. Determine the unused depreciation on the old machine.

Unused Depreciation on Old Asset
(Depreciable Cost = $36,000)

	MACRS Value		*Depreciation*
Year 1	0.000	Year 1	0
Year 2	0.000	Year 2	0
Year 3	0.000	Year 3	0
Year 4	0.115	Year 4	4,140
Year 5	0.115	Year 5	4,140
Year 6	0.058	Year 6	2,088

Note: The accumulated depreciation for the first three years is not shown here but is equal to $25,632. In other words, the accumulated depreciation is equal to the sum of the first three values in the MACRS table times the depreciable cost: i.e.
(0.200 + 0.320 + 0.192) * $36,000 = $25,632.

c. Determine the cash inflows (after depreciation and taxes) associated with the new machine.

CALCULATION OF CHANGE IN DEPRECIATION
(needed for the calculation of the cash inflows)

		New	-	*Old*	=	*Increase*
Next Year	=	$8,878	-	$4,140	=	$4,738
Year 2	=	14,204	-	4,140	=	10,064
Year 3	=	8,522	-	2,088	=	6,434
Year 4	=	5,105	-	0	=	5,105
Year 5	=	5,105	-	0	=	5,105
Year 6	=	2,575	-	0	=	2,575

DETERMINATION OF CASH INFLOWS:

Yr.	*Net Savings*	*x*	*(1-t.r.)*	+	*Chg. in Deprec.*	*x*	*Tax Rate*	=	*Cash Inflow**
1	8,100	x	0.66	+	4,738	x	0.34	=	$6,957
2	7,800	x	0.66	+	10,064	x	0.34	=	8,570
3	7,400	x	0.66	+	6,434	x	0.34	=	7,072
4	7,000	x	0.66	+	5,105	x	0.34	=	6,356
5	6,550	x	0.66	+	5,105	x	0.34	=	6,059
6	6,200	x	0.66	+	2,575	x	0.34	=	4,967

* Does Not Include These Terminal Cash Flows:

Working Capital	=	$1,412	(Cash Inflow)
Change in Salvage Value	=	1,315	(Cash Inflow)
Tax on Salvage Value	=	447	(Cash Outflow)
Total Terminal Cash Flows	=	$2,280	(Cash Inflow)

where the tax on the salvage value of the new asset (shown above) is:

Salvage Value	$1,315
x Tax Rate	x 0.34
Tax on Sale of New Asset	$ 447

d. Determine the cash outflows associated with the machine. Then determine the present value of both the cash outflows and the cash inflows.

CASH OUTFLOWS		@ 6%	CASH INFLOWS					
(0)	Cost of Asset	43,588	(1)	6,957	x	0.943	=	$6,560
	Transportation	800	(2)	8,570	x	0.890	=	7,627
	Working Capital	1,412	(3)	7,072	x	0.840	=	5,940
	Sale Proceeds	(8,300)	(4)	6,356	x	0.792	=	5,034
	Tax on Sale of Old	(703)	(5)	6,059	x	0.747	=	4,526
			(6)	7,247	x	0.705	=	5,109
	P.V. of Costs =	$36,797				***P.V. of Benefits*** =		$34,796

where the Tax on the Sale of the Old Asset is:

Step #1:	Original Cost	$36,000	*Step #2:*	Selling Price	$8,300
	- Accum. Deprec.	- 25,632		- Book Value	10,362
	Book Value	$10,368		Gain (Loss)	($2,068)

Step #3:	Gain (or Loss)	($2,068)
	x Tax Rate	x 0.34
	Tax on Sale of Old Asset	($ 703)

e. Determine the net present value of the proposed project, as well as the profitability index.

By definition, the Net Present Value is equal to the Present Value of the Benefits minus the Present Value of the Costs. Therefore, the Net Present Value is $34,796 - $36,797 or an NPV of ($2,001).

The Profitability Index is a ratio of the benefits to the costs. Therefore, the Profitability Index is 0.95 for this project.

f. Determine the internal rate of return on the new machine.

When we used 6% as the discount rate, we found that the project has a negative NPV. This tells us that the project's rate of return is less than 6%. Therefore, let's rerun the analysis using a lower rate of return, such as 4% or 5%.

When we use 4% as the discount rate, we receive a present value of the benefits of $37,046. This is larger than the present value of the costs, therefore we know that the project is expected to earn more than 4%. We could stop here and interpolate, but let's try one more time to get as narrow a range as possible.

When we use 5% as the discount rate, we receive a present value of the benefits of $35,893. Since this is less than the PVC, the project should earn less than 5%.

Since the project's rate of return is between 4% and 5%, let's interpolate to find the exact internal rate of return.

INTERPOLATION

		4%	37,046		
	difference on top is X			difference on top is 249	
outside difference is 1%		I.R.R.	36,797		outside difference is 1,153
		5%	35,893		

Interpolating to find the value of X, we set up a simple proportion:

$$\frac{X}{1\%} = \frac{249}{1{,}153}$$

$$X = \frac{249}{1{,}153} * 1\%$$

$$X = 0.22\%$$

The IRR is greater than 4% and 0.22% away from 4%. Therefore, the IRR must be equal to 4.22%.

g. Determine the modified internal rate of return (MIRR) for the new machine.

We determine the *future value* of the cash inflows and then solve for the rate of return that would equate the *present value of the costs* and the *future value of the inflows.*

CASH OUTFLOWS		@ 6%	CASH INFLOWS					
(0)	Cost of Asset	43,588	(1)	6,957	x	1.338	=	$9,310
	Transportation	800	(2)	8,570	x	1.262	=	10,819
	Working Capital	1,412	(3)	7,072	x	1.191	=	8,423
	Sale Proceeds	(8,300)	(4)	6,356	x	1.124	=	7,141
	Tax on Sale of Old	(703)	(5)	6,059	x	1.060	=	6,422
			(6)	7,247	x	1.000	=	7,274
	P.V. of Costs **=**	$36,797				***F.V. of Benefits*** **=**		$49,362

If the project costs $36,797 today and it generates cash of $49,362 after six years, what is the project's rate of return? We use the geometric mean return formula to solve for the rate of return:

$$\text{Rate of return} = \sqrt[n]{\frac{\text{Ending value}}{\text{Beginning value}}} - 1$$

$$\text{Rate of return} = \sqrt[6]{\frac{\$49,362}{\$36,797}} - 1$$

$$\text{Rate of return} = 1.3415^{(\frac{1}{6})} - 1$$

$$\text{Rate of return} = 1.3415^{0.166667} - 1$$

$$\text{Rate of return} = 0.0502 \text{ or } 5.02\%$$

h. Determine the payback period for the new machine.

CALCULATION OF PAYBACK PERIOD

Year	Cash Outflow	Cash Inflow	Amount Owed	No. of Years
0	$36,797		$36,797	
1		6,957	29,840	1.00
2		8,570	21,270	1.00
3		7,072	14,199	1.00
4		6,356	7,843	1.00
5		6,059	1,784	1.00
6		7,247	0	0.25
			Payback Period **=**	5.25

The payback period is 5.25 years.