

CAPITAL BUDGETING PRACTICE PROBLEMS

Self-Study Question

Nu-Concepts, Inc., a southeastern advertising agency, is considering the purchase of new computer equipment and software to enhance its graphics capabilities. Management has been considering several alternative systems, and a local vendor has submitted a quote to the company of \$15,000 for the equipment plus \$16,800 for software. Assume that the equipment can be depreciated for tax purposes over three years as follows: year 1, \$5,000; year 2, \$5,000; year 3, \$5,000. The software can be written off immediately for tax purposes. The company expects to use the new machine for four years and to use straight-line depreciation for financial reporting purposes. The market for used computer systems is such that Nu-Concepts could sell the equipment for \$2,000 at the end of four years. The software would have no salvage value at that time.

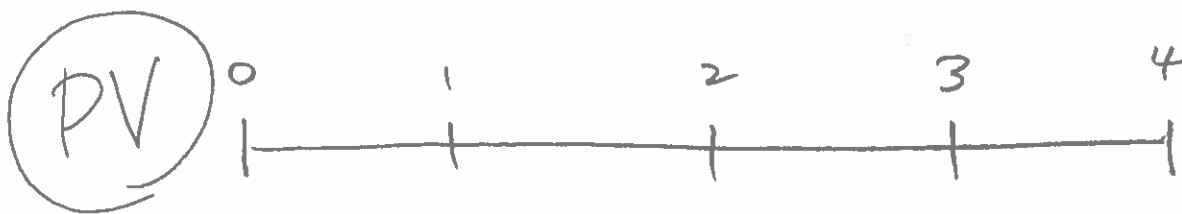
Nu-Concepts management believes that the introduction of the computer system will enable the company to dispose of its existing equipment, which is fully depreciated for tax purposes. It can be sold for an estimated \$200 but would have no salvage value in four years. If Nu-Concepts does not buy the new equipment, it would continue to use the old graphics system for four more years.

Management believes that it will realize improvements in operations and benefits from the computer system worth \$16,000 per year before taxes.

Nu-Concepts uses a 10 percent discount rate for this investment and has a marginal income tax rate of 40 percent after considering both state and federal taxes.

- a. Prepare a schedule showing the relevant cash flows for the project.
- b. Indicate whether the project has a positive or negative net present value.

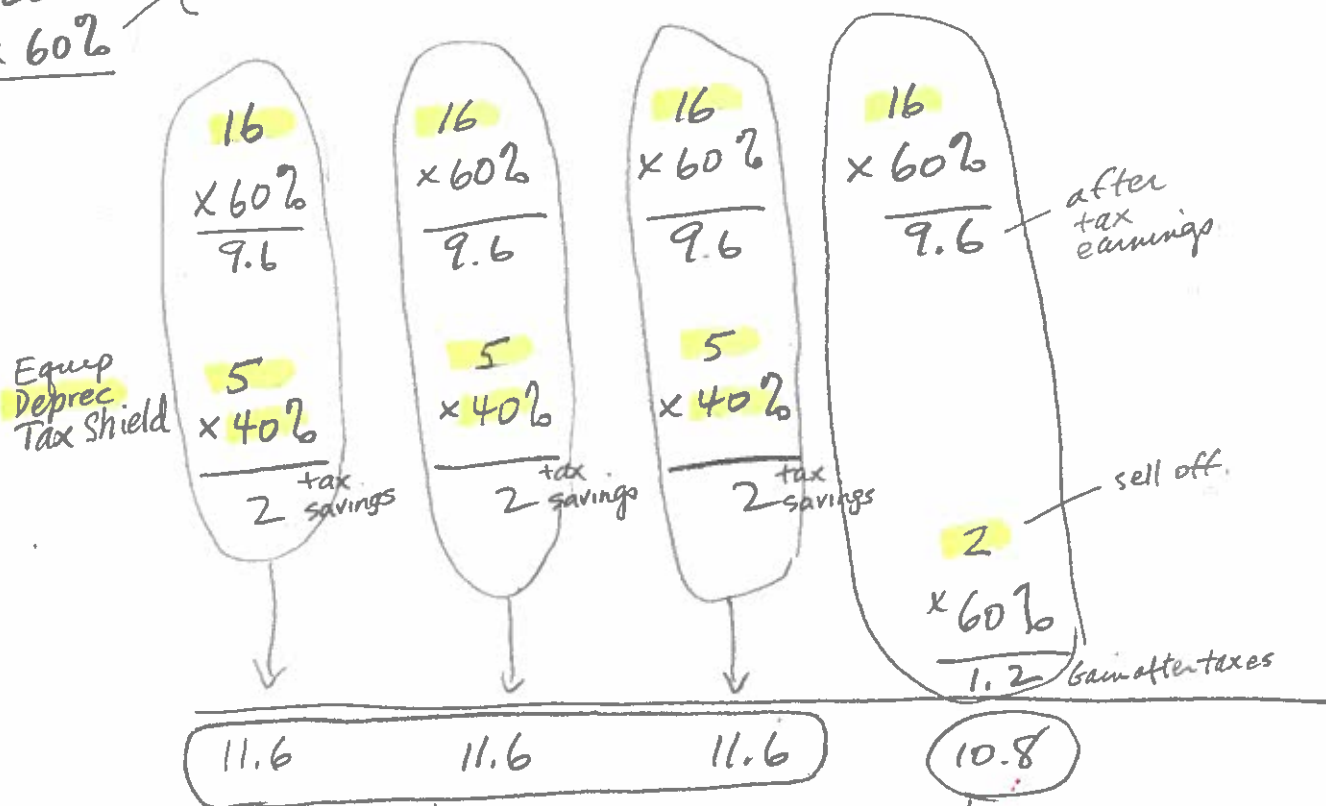
(000)



$$(15) = (15)$$

$$(10.08) = \left(\frac{16.8}{60\%} \right) \left[\begin{array}{l} \text{Less } 40\% \text{ tax shield} \\ \text{from immediate} \\ \text{"write off" deduction} \\ \text{of software.} \end{array} \right] \text{ or } \left[(16.8) \text{ invested} + \frac{16.8}{60\%} \times 40\% \text{ taxes shielded} \right] = 10.08$$

$$+.120 = \frac{.200}{60\%} (1 - 40\% \text{ tax rate})$$



$$+ 28,838$$

$$+ 7,376$$

$$\# \underline{11.254} = NPV > 0 \quad \text{irr} > 10\%$$

$$2.486 \left(\begin{array}{l} n=3 \\ i=10\% \end{array} \right)$$

$$x .683 \left(\begin{array}{l} n=4 \\ i=10\% \end{array} \right)$$

	Year				
	0	1	2	3	4
Investment flows					
New equipment	\$(15,000)				
Software (\$16,800 × 60%) ^a	(10,080)				
Old equipment (\$200 × 60%)	120				
Annual cash flows (\$16,000 × 60%)		\$ 9,600	\$ 9,600	\$ 9,600	\$ 9,600
Depreciation tax shield (\$5,000 × 40%)		2,000	2,000	2,000	
Disinvestment flows (\$2,000 × 60%)					1,200
Total cash flows	\$(24,960)	\$11,600	\$11,600	\$11,600	\$10,800
Present value factor at 10%	1.000	0.909	0.826	0.751	0.683
Present values ^b	\$(24,960)	\$10,544	\$ 9,582	\$ 8,712	\$ 7,376
Net present value		<u>\$ 11,254</u>			

^a 60% = 1 – 40% tax rate, which converts before-tax flows to after-tax flows.

^b Present value factor shown is rounded to three places. Present value factors are shown in Exhibit A.8.

Compute Net Present Value

Dungan Corporation is evaluating a proposal to purchase a new drill press to replace a less efficient machine presently in use. The cost of the new equipment at time 0, including delivery and installation, is \$200,000. If it is purchased, Dungan will incur costs of \$5,000 to remove the present equipment and revamp its facilities. This \$5,000 is tax deductible at time 0. *Amounts are given ~ No need to calculate. Not using DDB*

Depreciation for tax purposes will be allowed as follows: year 1, \$40,000; year 2, \$70,000; and in each of years 3 through 5, \$30,000 per year. The existing equipment has a book and tax value of \$100,000 and a remaining useful life of 10 years. However, the existing equipment can be sold for only \$40,000 and is being depreciated for book and tax purposes using the straight-line method over its actual life. *$40,000/10 = 4,000$*

Management has provided you with the following comparative manufacturing cost data:

	Present Equipment	New Equipment	
Annual capacity (units)	400,000	400,000	
Annual costs:			
Labor	\$30,000	\$25,000	
Depreciation	10,000	14,000	
Other (all cash)	48,000	20,000	
Total annual costs	\$88,000	\$59,000	

Net Saving

Non-cash → *78,000* - *14,000* = *45,000 = 33,000*

$45,000 \times (1 - 40) = 19,800$

pay for 10 yrs

The existing equipment is expected to have a salvage value equal to its removal costs at the end of 10 years. The new equipment is expected to have a salvage value of \$60,000 at the end of 10 years, which will be taxable, and no removal costs. No changes in working capital are required with the purchase of the new equipment. The sales force does not expect any changes in the volume of sales over the next 10 years. The company's cost of capital is 16 percent, and its tax rate is 40 percent.

Required

- Calculate the removal costs of the existing equipment net of tax effects.
- Compute the depreciation tax shield.
- Compute the forgone tax benefits of the old equipment.
- Calculate the cash inflow, net of taxes, from the sale of the new equipment in year 10.
- Calculate the tax benefit arising from the loss on the old equipment.
- Compute the annual differential cash flows arising from the investment in years 1 through 10.
- Compute the net present value of the project.

Compute Net Present Value: Dungan Corporation.

a. Equipment removal net of tax effects = \$3,000 = \$5,000 x (1 - 40%).

b. Depreciation schedule:

Year	Depreciation	Tax Shield at 40% ^{<i>tax</i>} [<i>rate</i>]	^{<i>i = 16%</i>} Present Value Factor (16%)	Present Value
1	\$ 40,000	\$16,000	.862	\$13,792
2	70,000	28,000	.743	20,804
3	30,000	12,000	.641	7,692
4	30,000	12,000	.552	6,624
5	30,000	12,000	.476	5,712
Totals	<u>\$200,000</u>	<u>\$80,000</u>		<u>\$54,624</u>

c. Forgone tax benefits: \$4,000 = (\$100,000 ÷ 10 years) x 40%

d. Gain from salvage of new equipment:

$$\$36,000 = \$60,000 \times (1 - 40\%)$$

e. Tax benefit arising from loss on old equipment:

$$\$24,000 = (\$100,000 \text{ book value} - \$40,000 \text{ salvage value}) \times .40 \text{ tax rate}$$

f. Differential cash flows (years 1 - 10):

$$\$19,800 = [(\$30,000 + \$48,000) - (\$25,000 + \$20,000)] \times (1 - 40\%)$$

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A-17 (continued)

g.

	Year										
	0	1	2	3	4	5	6	7	8	9	10
Investment flows:											
Equipment cost.....	\$(200,000)										
Removal.....	(3,000)										
Salvage of old equipment.....	40,000										
Tax benefit—sale of old equipment	24,000										
Periodic operating flows.....		\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800
Tax shield from depreciation:											
New equipment:											
Year 1.....		16,000									
Year 2.....			28,000								
Years 3–5.....				12,000	12,000	12,000					
Old equipment (forgone)		(4,000)	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)	(4,000)
Disinvestment:											
Proceeds of disposal.....											60,000
Tax on gain.....											(24,000)
Total cash flows.....	(139,000)	\$31,800	\$43,800	\$27,800	\$27,800	\$27,800	\$15,800	\$15,800	\$15,800	\$15,800	\$51,800
PV factor at 16%.....		.862	.743	.641	.552	.476	.410	.354	.305	.263	.227
Present values.....	139,158	\$27,412	\$32,543	\$17,820	\$15,346	\$13,233	\$ 6,478	\$ 5,593	\$4,819	\$ 4,155	\$11,759
Net present value.....	\$ 158										

i = 16%

Present Value of a Lump Sum Table

Year	5%	6%	8%	10%	12%	14%	15%	16%	18%	20%
1	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	0.907	0.890	0.857	0.826	0.797	0.769	0.756	0.743	0.718	0.694
3	0.864	0.840	0.794	0.751	0.712	0.675	0.658	0.641	0.609	0.579
4	0.823	0.792	0.735	0.683	0.636	0.592	0.572	0.552	0.516	0.482
5	0.784	0.747	0.681	0.621	0.567	0.519	0.497	0.476	0.437	0.402
6	0.746	0.705	0.630	0.564	0.507	0.456	0.432	0.410	0.370	0.335
7	0.711	0.665	0.583	0.513	0.452	0.400	0.376	0.354	0.314	0.279
8	0.677	0.627	0.540	0.467	0.404	0.351	0.327	0.305	0.266	0.233
9	0.645	0.592	0.500	0.424	0.361	0.308	0.284	0.263	0.225	0.194
10	0.614	0.558	0.463	0.386	0.322	0.270	0.247	0.227	0.191	0.162
11	0.585	0.527	0.429	0.350	0.287	0.237	0.215	0.195	0.162	0.135
12	0.557	0.497	0.397	0.319	0.257	0.208	0.187	0.168	0.137	0.112
13	0.530	0.469	0.368	0.290	0.229	0.182	0.163	0.145	0.116	0.093
14	0.505	0.442	0.340	0.263	0.205	0.160	0.141	0.125	0.099	0.078
15	0.481	0.417	0.315	0.239	0.183	0.140	0.123	0.108	0.084	0.065
Year	22%	24%	25%	26%	28%	30%	32%	34%	35%	40%
1	0.820	0.806	0.800	0.794	0.781	0.769	0.758	0.746	0.741	0.714
2	0.672	0.650	0.640	0.630	0.610	0.592	0.574	0.557	0.549	0.510
3	0.551	0.524	0.512	0.500	0.477	0.455	0.435	0.416	0.406	0.364
4	0.451	0.423	0.410	0.397	0.373	0.350	0.329	0.310	0.301	0.260
5	0.370	0.341	0.328	0.315	0.291	0.269	0.250	0.231	0.223	0.186
6	0.303	0.275	0.262	0.250	0.227	0.207	0.189	0.173	0.165	0.133
7	0.249	0.222	0.210	0.198	0.178	0.159	0.143	0.129	0.122	0.095
8	0.204	0.179	0.168	0.157	0.139	0.123	0.108	0.096	0.091	0.068
9	0.167	0.144	0.134	0.125	0.108	0.094	0.082	0.072	0.067	0.048
10	0.137	0.116	0.107	0.099	0.085	0.073	0.062	0.054	0.050	0.035
11	0.112	0.094	0.086	0.079	0.066	0.056	0.047	0.040	0.037	0.025
12	0.092	0.076	0.069	0.062	0.052	0.043	0.036	0.030	0.027	0.018
13	0.075	0.061	0.055	0.050	0.040	0.033	0.027	0.022	0.020	0.013
14	0.062	0.049	0.044	0.039	0.032	0.025	0.021	0.017	0.015	0.009
15	0.051	0.040	0.035	0.031	0.025	0.020	0.016	0.012	0.011	0.006

Present Value of an Annuity Table

Year	5%	6%	8%	10%	12%	14%	15%	16%	18%	20%
1	0.952	0.943	0.926	0.909	0.893	0.877	0.870	0.862	0.847	0.833
2	1.859	1.833	1.783	1.736	1.690	1.647	1.626	1.605	1.566	1.528
3	2.723	2.673	2.577	2.487	2.402	2.322	2.283	2.246	2.174	2.106
4	3.546	3.465	3.312	3.170	3.037	2.914	2.855	2.798	2.690	2.589
5	4.329	4.212	3.993	3.791	3.605	3.433	3.352	3.274	3.127	2.991
6	5.076	4.917	4.623	4.355	4.111	3.889	3.784	3.685	3.498	3.326
7	5.786	5.582	5.206	4.868	4.564	4.288	4.160	4.039	3.812	3.605
8	6.463	6.210	5.747	5.335	4.968	4.639	4.487	4.344	4.078	3.837
9	7.108	6.802	6.247	5.759	5.328	4.946	4.772	4.607	4.303	4.031
10	7.722	7.360	6.710	6.145	5.650	5.216	5.019	4.833	4.494	4.192
11	8.306	7.887	7.139	6.495	5.938	5.453	5.234	5.029	4.656	4.327
12	8.863	8.384	7.536	6.814	6.194	5.660	5.421	5.197	4.793	4.439
13	9.394	8.853	7.904	7.103	6.424	5.842	5.583	5.342	4.910	4.533
14	9.899	9.295	8.244	7.367	6.628	6.002	5.724	5.468	5.008	4.611
15	10.380	9.712	8.559	7.606	6.811	6.142	5.847	5.575	5.092	4.675
Year	22%	24%	25%	26%	28%	30%	32%	34%	35%	40%
1	0.820	0.806	0.800	0.794	0.781	0.769	0.758	0.746	0.741	0.714
2	1.492	1.457	1.440	1.424	1.392	1.361	1.331	1.303	1.289	1.224
3	2.042	1.981	1.952	1.923	1.868	1.816	1.766	1.719	1.696	1.589
4	2.494	2.404	2.362	2.320	2.241	2.166	2.096	2.029	1.997	1.849
5	2.864	2.745	2.689	2.635	2.532	2.436	2.345	2.260	2.220	2.035
6	3.167	3.020	2.951	2.885	2.759	2.643	2.534	2.433	2.385	2.168
7	3.416	3.242	3.161	3.083	2.937	2.802	2.677	2.562	2.508	2.263
8	3.619	3.421	3.329	3.241	3.076	2.925	2.786	2.658	2.598	2.331
9	3.786	3.566	3.463	3.366	3.184	3.019	2.868	2.730	2.665	2.379
10	3.923	3.682	3.571	3.465	3.269	3.092	2.930	2.784	2.715	2.414
11	4.035	3.776	3.656	3.543	3.335	3.147	2.978	2.824	2.752	2.438
12	4.127	3.851	3.725	3.606	3.387	3.190	3.013	2.853	2.779	2.456
13	4.203	3.912	3.780	3.656	3.427	3.223	3.040	2.876	2.799	2.469
14	4.265	3.962	3.824	3.695	3.459	3.249	3.061	2.892	2.814	2.478
15	4.315	4.001	3.859	3.726	3.483	3.268	3.076	2.905	2.825	2.484