Instructor: Dr. Hall | **Accounting 460** | **Estimated time**
CPA Problems | **40-50 minutes**
Handout Problem No. C-180

Spara Corp. is considering the various benefits that may result from the shortening of its product cycle by changing from the company's present manual system to a computer-aided design/computer-aided manufacturing (CAD/CAM) system. The proposed system can provide productive time equivalency close to the 20,000 hours currently available with the manual system. The incremental annual out-of=pocket costs of maintaining the manual system are $20 per hour.

The incremental annual out-of-pocket costs of maintaining the CAD/CAM system are estimated to be $200,000, with an initial investment of $480,000 in the proposed system. The estimated useful life of this system is six years. For tax purposes, assume a level accelerated cost recovery with a full year allowable in each year. The tax rate is expected to remain constant at 30% over the life of the project. Spara requires a minimum after-tax return of 20% on projects of this type. Full capacity will be utilized.

Required:

a. Compute the relevant annual after-tax cash flows related to the CAD/CAM project.

b. Based on the computation in **a.** above, compute the following on an after-tax basis:
1. Payback period for recovery of investment.
2. Internal rate of return (use the appropriate table)
3. Net present value (use the appropriate table)
4. Excess present value index (profitability index).

TABLE 1

Compound Amount of $1.00 (The Future Value of $1.00)
$S = P(1 + r)^n$. In this table P = $1.00.

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	1.040	1.060	1.080	1.100	1.120	1.140	1.160	1.180	1.200	1.220	1.240	1.260
2	1.082	1.124	1.166	1.210	1.254	1.300	1.346	1.392	1.440	1.488	1.538	1.588
3	1.125	1.191	1.260	1.331	1.405	1.482	1.561	1.643	1.728	1.816	1.907	2.000
4	1.170	1.262	1.360	1.464	1.574	1.689	1.811	1.939	2.074	2.215	2.364	2.520
5	1.217	1.338	1.469	1.611	1.762	1.925	2.100	2.288	2.488	2.703	2.932	3.176
6	1.265	1.419	1.587	1.772	1.974	2.195	2.436	2.700	2.986	3.297	3.635	4.002

TABLE 2

$$P = \frac{S}{(1+r)^n}$$ In this table S = $1.00.

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	0.962	0.943	0.926	0.909	0.893	0.877	0.862	0.847	0.833	0.820	0.806	0.794
2	0.925	0.890	0.857	0.826	0.797	0.769	0.743	0.718	0.694	0.672	0.650	0.630
3	0.889	0.840	0.794	0.751	0.712	0.675	0.641	0.609	0.579	0.551	0.524	0.500
4	0.855	0.792	0.735	0.683	0.636	0.592	0.552	0.516	0.482	0.451	0.423	0.397
5	0.822	0.747	0.681	0.621	0.567	0.519	0.476	0.437	0.402	0.370	0.341	0.315
6	0.790	0.705	0.630	0.564	0.507	0.456	0.410	0.370	0.335	0.303	0.275	0.250

TABLE 3

Compound Amount of Annuity of $1.00 in Arrears* (Future Value of Annuity)

$$S_n = \frac{(1+r)^n - 1}{r}$$

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.040	2.060	2.080	2.100	2.120	2.140	2.160	2.180	2.200	2.220	2.240	2.260
3	3.122	3.184	3.246	3.310	3.374	3.440	3.506	3.572	3.640	3.708	3.778	3.848
4	4.246	4.375	4.506	4.641	4.779	4.921	5.066	5.215	5.368	5.524	5.684	5.848
5	5.416	5.637	5.867	6.105	6.353	6.610	6.877	7.154	7.442	7.740	8.048	8.368
6	6.633	6.975	7.336	7.716	8.115	8.536	8.977	9.442	9.930	10.442	10.980	11.544

TABLE 4

Present Value of Annuity of $1.00 in Arrears* *Payments (or receipts) at the end of each period.

$$P_n = \frac{1}{r}\left|1\frac{1}{(1+r)^n}\right|$$

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	0.962	0.943	0.926	0.909	0.893	0.877	0.862	0.847	0.833	0.820	0.806	0.794
2	1.886	1.833	1.783	1.736	1.690	1.647	1.605	1.566	1.528	1.492	1.457	1.424
3	2.775	2.673	2.577	2.487	2.402	2.322	2.246	2.174	2.106	2.042	1.981	1.923
4	3.630	3.465	3.312	3.170	3.037	2.914	2.798	2.690	2.589	2.494	2.404	2.320
5	4.452	4.212	3.993	3.791	3.605	3.433	3.274	3.127	2.991	2.864	2.745	2.635
6	5.242	4.917	4.623	4.355	4.111	3.889	3.685	3.498	3.326	3.167	3.020	2.885