HW #5

4-20, 4-24, 4-30, 4-38, 4-44, 4-46

4-20 AW(12%) = -\$100,000 (A/P, 12%, 5) + \$120,000 (A/F, 12%, 5) - \$5,000
- \$9,000 (P/F, 12%,3)(A/P, 12%,5)
+ [\$10,000 + \$10,000 (P/A, 12%, 4)] (A/P, 12%,5)
= -\$100,000(0.2774) + \$120,000(0.1574) - \$5,000
- \$9,000 (0.7118)(0.2774)
+ [\$10,000 + \$10,000(3.0373)](0.2774)
= -\$4,429.61

Since AW < 0, this is not a good investment

4-24 PW(i'%) of outflows = PW(i'%) of inflows

\$308.57 (P/A,i'%,35) = \$7,800

(P/A,i'%,35) = 25.2779

(P/A,1%,35) = 29.4085 and (P/A,2%,35) = 24.9986, Therefore, 1% < i'% < 2%.

Linear interpolation yields: i'% = 1.9% per month

A.P.R = (1.9% per month)(12 months/year)

= 22.8% compounded monthly

4-30 Assume that the task is to produce 40,000 pieces / yr.

Old Machine (No Brake):

Production time/year = (40,000 pieces/yr)(2.5 min/pc)(1hr/60 min)
= 1,666.67 hr/ yr

Operator salary = \$16.50/hr (1,666.67 hr / yr)		= \$27,500.06 / yr
Overhead = \$4.00/hr (1,666.67 hr/ yr)		= \$ 6,666.68 / yr
	Total Cost	= \$34,166.74

New Machine (With Brake):

Production time/year = (40,000 pieces/yr)(2.05 min/pc)(1hr/60 min)
= 1,366.67 hr/yr

Operator salary = \$16.50 / hr(1,366.67 hr / yr)		= \$22,550.06 / yr
Overhead = \$4.00 / hr (1,366.67 hr/ yr)		= \$ 5,466.68 / yr
Maintenance		= \$ 250.00 / yr
	Total Cost	= \$28,266.74/ yr

4-38 **(a)** **PW(i'%) = 0 = - \$23,000 - \$1,200 (P/A,i'%,4) - \$8,000 (P/F,i'%,4)**
+ \$5,500 (P/A,i'%,11)(P/F,i'%,4) +\$33,000 (P/F,i'%,15)

By linear interpolation, i'% = IRR = 10%

(b) **FW (12%) = - \$23,000(F/P,12%,15) - \$1,200(F/A,12%,4)(F/P,12%,11)**
- \$8,000(F/P,12%,11) + \$5,500 (F/A,12%,11) + \$33,000
= - \$23,000(5.4736) - \$1,200(4.7793)(3.4785) - \$8,000(3.4785)
+ \$5,500 (20.6546) + \$33,000
= -\$27,070.25

(c) |-\$23,000 - \$1,200(P/A,12%,4) - \$8,000(P/F,12%,4)| (F/P,i'%,15)
= \$5,500(F/A,12%,11) + \$33,000

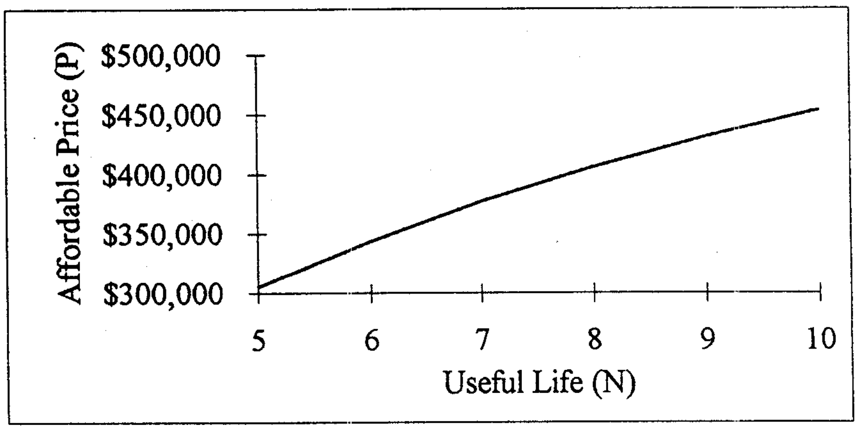
[\$23,000 + \$1,200(3.0373) + \$8,000(0.6355)] (F/P,i'%,15)
= \$5,500(20.6546) + \$33,000

\$31,728.76 $(1 + i')^{15}$ = \$146,600.30

i' = ERR = 0.1074 or 10.74%

4-44 **(a)** PW(15%) = -P + \$90,000 (P/A, 15%, N) + \$7,000 (P/F, 15%, N) = 0

N years	P (= affordable price)
5	\$305,178
6	343,631
7	377,067
8	406,145
9	431,434
10	453,422



(b) $\theta \approx$ \$344,000 / \$90,000 $\approx$ 4 years

4-46 **(a)** PW(i'%) = 0 = -\$100,000 + \$20,000 (P/A,i'%,5) + \$10,000 (P/G,i'%,5) + \$10,000 (P/F,i'%,5)

PW(20%) = \$12,891 > 0, ∴ i'% > 20%
PW(25%) = -\$897 < 0, ∴ i'% < 25%

By linear interpolation, i'% = IRR = 24.7%

(b)

EOY	Cumulative Cash Flow
1	-\$100,000 + \$20,000 = -\$80,000 < 0
2	-80,000 + 30,000 = -50,000 < 0
3	-50,000 + 40,000 = -10,000 < 0
4	-10,000 + 50,000 = 40,000 > 0

∴ θ = 4 years

Although this project is profitable (IRR > MARR), it is not acceptable since θ = 4 years is greater than the maximum allowable simple payback period of 3 years.