HW#6 - 5-2, 5-4, 5-16, 5-26

5-2 **(a)** **The AW of each alternative design is computed as follows:**

Design 1: AW(15%) = -$28,000(A/P,15%,10) + $5,500 + $1,500(A/F,15%,10)
= -$6.45

Design 2: AW(15%) = -$16,000(A/P,15%,10) + $3,300
= $111.20

Design 3: AW(15%) = -$23,500(A/P,15%,10) + $4,800 + $500(A/F,15%,10)
= $141.10

Design 1 has a negative AW and is dropped from further consideration.
Design 3 would be recommended because it has the greatest positive AW value.

(b) The FW of each alternative design is computed as follows:

Design 1: FW(15%) = $1,500 + $5,500(F/A,15%,10) - $28,000(F/P,15%,10)
= -$106.45

Design 2: FW(15%) = $3,300(F/A,15%,10) - $16,000(F/P,15%,10)
= $2,272.61

Design 3: FW(15%) = $500 + $4,800(F/A,15%,10) - $23,500(F/P,15%,10)
= $2,886.16

Design 1, as in Part (a), has a negative equivalent worth and would be dropped from further consideration. Design 3 would be recommended because it has the greatest positive FW value.

5-4 **Annual Worth Method, MARR = 12%**

AW_{AH} (12%) = $69,000 - $300,000(A/P,12%,30) + 0.2 ($300,000)(A/F,12%,30)
= $32,016

AW_{T} (12%) = $40,000 - $200,000 (A/P,12%,30) + 0.2 ($200,000)(A/F,12%,30)
= $15,344

AW_{DS} (12%) = $55,000 - $250,000 (A/P,12%,30) + 0.2 ($250,000)(A/F,12%,30)
= $24,180

AW_{OB} (12%) = $76,000 - $400,000 (A/P,12%,30) + 0.2 ($400,000)(A/F,12%,30)
= $26,688

Select the apartment house to maximize annual worth.

5-16 Assume repeatability over a 10-year study period.

HW

$$AW_A(12\%) = -\$2{,}000(A/P,12\%,5) + \$600 = \$45.20$$
$$AW_B(12\%) = -\$8{,}000(A/P,12\%,5) + \$2{,}200 = -\$19.20$$
$$AW_C(12\%) = -\$20{,}000(A/P,12\%,10) + \$3{,}600 = \underline{\$60.00}$$

Select alternative C to maximize equivalent worth.

5-26

$$CW_{D1}(10\%) = \frac{[-\$50{,}000(A/P,10\%,20) + \$10{,}000(A/F,10\%,20) - \$9{,}000]}{0.10}$$
$$= \underline{-\$147{,}000}$$

HW

$$CW_{D2}(10\%) = \frac{[-\$120{,}000(A/P,10\%,50) + \$20{,}000(A/F,10\%,50) - \$5{,}000]}{0.10}$$
$$= -\$170{,}900$$

Select Design D1 to minimize costs.
