Question 1

(a) $\frac{293 \text{ kwh}}{10^6 \text{ Btu}}$ ($0.04/kwh) = $11.72/$10^6$ Btu

R11: $-\$600 - (74 \times 10^6)(\$11.72/10^6)(P/A,0\%,25) = -\$22,282$

R19: $-\$900 - (69.8 \times 10^6)(\$11.72/10^6)(25) = -\$21,351.40$

R30: $-\$1,300 - (67.2 \times 10^6)(\$11.72/10^6)(25) = -\$20,989.60$

R38: $-\$1,600 - (66.2 \times 10^6)(\$11.72/10^6)(25) = -\$20,996.60$

Recommend R30 insulation by a slim margin to minimize life cycle costs.

(b) The cost of extra insulation is being traded-off against the value of reduction in lost heat.

Question 2

(a) Equate total costs of both lighting methods = (variable cost/hr.)H + fixed cost where H = hr./yr. of operating time.

$-\$10,000 - \$12.50 H = -\$25,000 - \$4.25 H$

$\$15,000 = 8.25 H$

H = 1,818 hr./yr.

(b) If work area is illuminated more than 1818 hr./yr., select fluorescent lighting to minimize costs.

When work areas are illuminated H < 1,818 hr./yr., select incandescent lighting.

Question 3

	Brass-Copper Alloy Casting	Plastic Molding
Mat'l.	$\frac{25 \text{ lbs.}}{\text{unit}}$ ($3.35/lb.) = $83.75/unit	$\frac{16 \text{ lbs.}}{\text{unit}}$ ($7.40/lb.) = $118.40/unit
Wt. Penalty	(25-16 lbs.)($4/lb.) = $36.00/unit	
Machining	= $ 6.00/unit	
	$125.75/unit	$118.40/unit

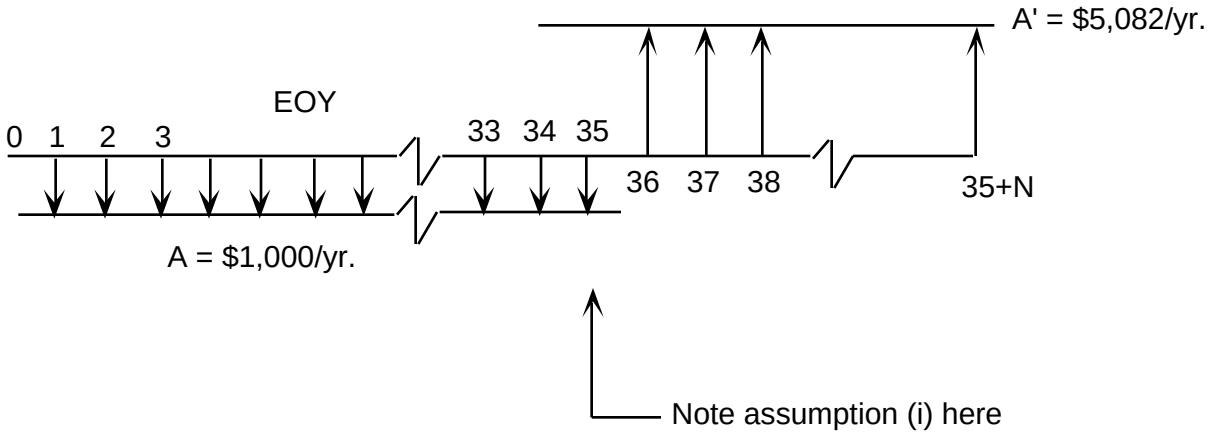
Δ = $7.35/unit

Select plastic molding to save $7.35 per unit.

This problem could have also been worked by (e.g.) considering the total weight of both types of radiators instead of the difference as above.

Question 4

(a)



(b) $F_{35} = \$1{,}000\ (F/A,5\%,35) \overset{90.3203}{=} \$90,320$

and $\$90,320 = (P/A,5\%,N)(\$5,082)$

$17.7725 = (P/A,5\%,N)$

so $N \simeq 45$ years

(c) (i) First withdrawal occurs one year after the last deposit.

(ii) You live to be at least 80 yrs. old.

(iii) Interest rate stays constant at 5% per year.

Question 5

(a) $\$10{,}000\,(A/P,8\%,3) = \$3{,}880$ (0.3880)

EOY k	Interest Paid	Principal Repayment	A	
1	\$800	? (3,080)	\$3,880	
2	\$553.60	\$3,326.40	3,880	
3	? (286.40)	? (\$3,593.60)	3,880	(This exact value of A is \$3,880.34)

$\$10{,}000 - \$3{,}080 - \$3{,}326.40 = \$3{,}593.60$

0.08 ($3,593.60) $286.40 (to make the EOY 3 amounts = $3,880)

(b) $i/\text{year} = \left(1 + \frac{0.08}{12}\right)^{12} - 1$

$= (1.006667)^{12} - 1$

$= 1.0829995 - 1$

$= 0.0829995$ (8.3%)

Question 6

(a) $P_0 = [7G(P/A,15\%,7) - G(P/G,15\%,7)](P/F,15\%,1)$

$+ 6G(P/F,15\%,8)$

(b) $i/year = (1 + 0.12/4)^4 - 1$

$\simeq 0.1255 \quad (12.55\%)$

$-Z - Z(P/A,12.55\%,4) = \$1,000(P/F,12.55\%,2) - \$5,000(P/F,12.55\%,6)$

$$\text{or } Z = \frac{\overset{0.7894}{\$1,000(P/F,12.55\%,2)} \quad - \overset{0.4920}{\$5,000(P/F,12.55\%,6)}}{[-1-\underset{3.0025}{(P/A,12.55\%,4)}]}$$

or $\boxed{Z = \$417.39}$

(c) It would not change because fixed costs have been estimated for 30,000 miles per year and variable costs per mile for 30,000 miles of driving should remain about the same.