

Problem 8-4

- Goal:**
- Determine required life of Pump B at which pumps are economically competitive
 - Determine which pump to recommend

Given:

Design:		Pump A	Pump B
Installed Cost	$C_0 =$	\$20,000	\$25,000
Salvage Value		\$2,000	\$4,000
interest rate		15%	
Service life, years	n	4	

Approach:

- Equate Capitalized Cost
 Capitalized Cost Eqn. $K = C_0 + C_R / [(1+i)^n - 1]$
 write Capitalized Cost Eqn. for both pumps, equate, and solve for n
 Alternate approach: solve equated costs = zero using "Solver"

Calculations:

Design:		Pump A	Pump B	
Replacement Cost	$C_R =$	\$18,000	\$21,000	Installed Cost - Salvage Value

Capitalized Cost \$44,031.84

solve Capitalized Cost Eqn. $K = C_0 + C_R / [(1+i)^n - 1]$ for n

$$K - C_0 = C_R / [(1+i)^n - 1]$$

$$[(1+i)^n - 1] = C_R / [K - C_0]$$

$$(1+i)^n = C_R / [K - C_0] + 1$$

$$n \ln(1+i) = \ln(C_R / [K - C_0] + 1)$$

$$n = \ln(C_R / [K - C_0] + 1) / \ln(1+i)$$

		5.32020204	\$44,031.84	match to the nearest penny
(\$102.84)	5.3		\$44,134.68	P&T textbook rounded ~1 month answer, \$100 high
(\$1.02)	5.32		\$44,032.86	rounded to nearest 4 days of life, \$1 high

using Solver : 5.32020 \$0.000 "Solver" result as %

Answer Life of Pump B **5.32** years for the two pumps to be competitive

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