**HW5: 8, 14, 19, 25, 39, 42**

\[ i = e^r - 1 \]

- **Years**
- **Mon 0**

\[ V \]

SOM

\[ A \]

2% per month, compounded continuously

\[ i_{\text{mon}} = e^{0.02} - 1 = 2.02\% \]

\[ A = \text{SOM} \left( \frac{A}{P}, 0.0202, 36 \right) \]

---

5. **Pw Eval of Alternatives**

- **Mutual Exclusive**
  - Pick only one

- **Independent**
  - Pick one or more if economically viable and available budget

- **Null Option**
  - Do nothing
PW Comparison of Equal-Life Alternatives

- Easiest
  - Receipts
  - Disbursements

\{ Vectors on CFD \}

ONE ALT (Really two if null is viable)

IF PW \geq 0, \text{ then the ALT IS ECONOMICALLY Viable}

TWO OR MORE ALTS

- CAN ONLY ACCEPT ONE
  - Mutually exclusive

- Select PW that is numerically larger
  - Most positive
  - Least negative

\[ \Delta = 12\% \]

\begin{align*}
\text{First Cost (P)} & \quad \text{Ann Oper Cost (AOC)} & \quad \text{Salvage Value (SV)} \\
\$10K & \quad \$2K & \quad \$1K \\
8K & \quad 2.5K & \quad 800
\end{align*}

\begin{align*}
\text{Life, yrs} & \quad \uparrow \\
0 & \quad 1 & \quad 2 & \quad 3 & \quad 4 & \quad 5 & \quad 6 & \quad 7 & \quad 800 \\
10K & \quad 2K & \quad 8K & \quad 2.5K
\end{align*}
\[ PW_x = -10K - 2K (P/A, 12\%, 7) + 1K (P/F, 12\%, 7) = -18,676 \]
\[ PW_y = -8K - 2.5K (P/A, 12\%, 7) + 800 (P/F, 12\%, 7) = -19,048 \]

Comparison of Different Life Alternatives

- Must compare over equal time horizon

\[
\begin{array}{ccc}
\text{MARR} = 9\% & \text{Vehicles} & \\
1 & 25K & 29K \\
2 & 2K & 1.9K \\
3 & 15K & 19K \\
4 & 3 & 5 \\
\end{array}
\]

For demonstration purposes only!

Do not use this approach!!

\[
P_{W1} = -25K - 2K (P/A, 0.09, 3) + 15K (P/F, 0.09, 3) \\
= -18,480 \times \\
P_{W2} = -29K - 1900 (P/A, 0.09, 5) + 19K (P/F, 0.09, 5) \\
= -24,042
\]

LCM - Least Common Multiple
- Assume allts are needed that long
- Assumes that cash flows repeat consistently

\[ LCM = 15 \]

\[ 3(5) = 15 \]
\[ PW_1 = -25K - 10K(P/F, 0.09, 3) - 10K(P/F, 0.09, 6) - 10K(P/F, 0.09, 9) - 10K(P/F, 0.09, 12) + 15K(P/F, 0.09, 15) - 2K(P/A, 0.09, 15) \]
\[ = -58,847 \]

\[ PW_2 = -29K - 10K(P/F, 0.09, 5) - 10K(P/F, 0.09, 10) + 19K(P/F, 0.09, 15) - 1900(P/F, 0.09, 15) \]
\[ = -49,822 \]

HWS: 8, 14, 19, 25, 39, 42

– LCM method
– Horizon method (life is set at \( n \))
Life Cycle

Definition of Life Cycle

1. Concept
2. Define
3. Development
4. Production
5. Deployment / Operation / Maintenance
6. Disposition
7. Replacement

Capitalized Cost (CC) $\rightarrow \infty$

PW of a project assumed to last forever (Think $\infty$)

- dam
- irrigation projects
- railroads
- permanent endowments

Shane's Scholarship $\rightarrow$ Annual Scholarship Amount

$1000 \rightarrow 10\% \rightarrow 10,000$

Deposit in Acct.