9.8 Cost: $200/household/year x 90M Households

Benefits: 12 Lives per Year
Find human life value @ B/C Ratio = 1.0

Anh Basis

\[ 1.0 = \frac{\text{Benefits} - \text{Disbenefits}}{\text{Costs}} \]

\[ 1.0 = \frac{12V - 0}{200(90M)} \]

\[ V = \$1.5B \]

9.11 FC = 4M
AOC = $300k
Benefits = $550k/yr
Disbenefits = $90k/yr
MARR = 4%

a.) Conventional B/C = \( \frac{B-D}{C} \)
\[ = \frac{550k - 90k}{4M(0.04) + 300k} = 1.0 \]
Acceptable

b.) Difference = (B-D) - C
\[ = (550k - 90k) - \left[ 4M(0.04) + 300k \right] = 0 \]

C.) Modified = \( \frac{B-D-0/m}{C} \)
\[ = \frac{550k - 90k - 300k}{4M(0.04)} = 1.00 \]
Acceptable
9.22

FC
A0C
Damage - $x \times 6$
Incr. B/C Analysis
MARR = 8\%, Life = 20 yrs.

**Costs:**

\[ AW_A = 600K(A/P, .08, 20) + 50K = \text{smaller} \]
\[ AW_B = 800K(A/P, .08, 20) + 70K = \text{larger} \]

USE B - A Increment

PW Basis

\[ \text{Costs / Incr} = 9,8181 \]
\[ = (800K - 600K) + (70K - 50K)(P/A, .08, 20) \]
\[ = 396,362 \]

**Benefits / Incr**

Benefit for B is avoiding loss for A = 950K
\[ \text{"""" A is """"} 6302 \text{"""" B: 250K} \]
\[ = (950K - 250K)(P/F, .08, 6) \]
\[ = 441,140 \]

Incr B/C = \[\frac{441,140}{396,362} = 1.11 > 1.0\]

**SELECT B**
9.30

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC</td>
<td>15K</td>
<td>19K</td>
<td>25K</td>
<td>33K</td>
</tr>
<tr>
<td>AOC</td>
<td>10K</td>
<td>12K</td>
<td>9K</td>
<td>11K</td>
</tr>
<tr>
<td>Benefits/yr</td>
<td>15K</td>
<td>20K</td>
<td>19K</td>
<td>22K</td>
</tr>
<tr>
<td>10 yr life, MARR = 15%</td>
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</tr>
</tbody>
</table>

**Aw of Costs**

1. \( A_w_A = 15K(A/P, .15, 10) + 10K = 12990 \)
2. \( A_w_B = 19K(A/P, .15, 10) + 12K = 15786 \)
3. \( A_w_C = 25K(A/P, .15, 10) + 9K = 13981 \)
4. \( A_w_D = 33K(A/P, .15, 10) + 11K = 17575 \)

**Order Low to High:** A, C, B, D

**Compare A to Null**

\( B/C = 15K/12990 = 1.15 > 1 \); keep A

**Compare C to A**

\( \Delta \text{COST} = 13981 - 12990 = 991 \)
\( \Delta \text{BEN} = 19K - 15K = 4K \)
\( B/C = 4K/991 = 4.0 > 1 \); keep C

**Compare B to C**

\( \Delta \text{COST} = 15786 - 13981 = 1805 \)
\( \Delta \text{BEN} = 20K - 19K = 1K \)
\( B/C = 1K/1805 = 0.6 < 1 \); keep C

**Compare D to C**

\( \Delta \text{COST} = 17575 - 13981 = 3594 \)
\( \Delta \text{BEN} = 22K - 19K = 3K \)
\( B/C = 3K/3594 = 0.8 < 1 \); keep C

° 0.19925