1. (35 p) Consider the cash flow shown in the accompanying diagram below. What value of $C$ makes the inflow series equivalent to the outflow series at an interest rate of 10%.

2. (35 p) Consider the two mutually exclusive investment projects in the table below:

<table>
<thead>
<tr>
<th>Period (n)</th>
<th>Project A</th>
<th>Project B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$20000</td>
<td>-$25000</td>
</tr>
<tr>
<td>1</td>
<td>17500</td>
<td>25500</td>
</tr>
<tr>
<td>2</td>
<td>17000</td>
<td>18000</td>
</tr>
<tr>
<td>3</td>
<td>15000</td>
<td>-</td>
</tr>
</tbody>
</table>

On the basis of the AE criterion, which project would be selected? Assume that MARR=12%

3. (30 p) A company purchased new packaging equipment with an estimated useful life of five years. The cost of equipment was $55,000, and the salvage value was estimated to be $5,000 at the end of year 5. Compute the annual depreciation expenses over the five-year life of the equipment under each of the following methods of book depreciation:
   a) Straight-line method
   b) Double Declining-Balance (DDB) method
1. Given: Cash flows yearly (K=1); \( r = 10\% \), M=1 (yearly); C=M/K=1

\[ i_p = (1 + \frac{r}{M})^C - 1 = (1 + \frac{0.10}{1})^1 - 1 = 0.10(10\% \text{ per year}) \]

**Base for Equivalence:** End of project service life

\[
F_{\text{inflow}} = 300(F/A,10\%,8) + 200(F/A,10\%,3)
\]

\[
F_{\text{outflow}} = 2C(F/P,10\%,8) + C(F/A,10\%,7)
\]

\[
F_{\text{inflow}} = F_{\text{outflow}}
\]

\[
300(F/A,10\%,8) + 200(F/A,10\%,3) = 2C(F/P,10\%,8) + C(F/A,10\%,7)
\]

(Interest Factors taken from Park Table/p.885)

\[ C = 297.13 \]

2. AE(12%)\(_A\) = - $20000(A/P,12\%,3) + $17500(P/F,12\%,1)(A/P,12\%,3)+ $17000(P/F,12\%,2)(A/P,12\%,3)+ $15000(P/F,12\%,3)(A/P,12\%,3)

\[ = - 20000(0.4163) + 17500(0.8929)(0.4163)+ 17000(0.7972)(0.4163)+ 15000(0.2963)\]

\[ = 8265.36 > 0 \] (Interest factors were taken from Park Table/p.887)

AE(12%)\(_B\) = - $25000(A/P,12\%,3) + $25500(P/F,12\%,1)(A/P,12\%,3)+ $18000(P/F,12\%,2)(A/P,12\%,3)

\[ = - 25000(0.4163) + 25500(0.8929)(0.4163)+ 18000(0.7972)(0.4163)\]

\[ = 5044.95 > 0 \] (Interest factors were taken from Park Table/p.887)

\[ 8265.36 > 5044.95 \rightarrow \text{AE(12\%)\(_A\) > AE(12\%)\(_B\)} \]

Decision: Project A is preferred.

3. Given:

\[ I = 55000, N = 5 \text{ years}, S = 5000 \]

\[ D_{SL} = \frac{I - S}{N} = \frac{55000 - 5000}{5} = 10000 \]

b) \[
\alpha = \left(\frac{1}{N}\right) (\text{Multiplier}) = \left(\frac{1}{5}\right) (2.0) = 0.4, D_n = aB_{n-1}; B_{n-1} = I(1-\alpha)^{n-1}
\]

\[ B_W = I(1 - \alpha)^N = 55000(1 - 0.4)^5 = 2128 < S \] (to reach salvage value, last year depreciation cost will be $2128)

From the corresponding depreciation formulas of the methods given above, the results are tabulated as follows:

<table>
<thead>
<tr>
<th>( n )</th>
<th>( D_n ($) )</th>
<th>( B_n ($) )</th>
<th>( D_n ($) )</th>
<th>( B_n ($) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>55000</td>
<td>55000</td>
<td>55000</td>
<td>55000</td>
</tr>
<tr>
<td>1</td>
<td>10000</td>
<td>45000</td>
<td>22000</td>
<td>33000</td>
</tr>
<tr>
<td>2</td>
<td>10000</td>
<td>35000</td>
<td>13200</td>
<td>19800</td>
</tr>
<tr>
<td>3</td>
<td>10000</td>
<td>25000</td>
<td>7920</td>
<td>11880</td>
</tr>
<tr>
<td>4</td>
<td>10000</td>
<td>15000</td>
<td>4752</td>
<td>7128</td>
</tr>
<tr>
<td>5</td>
<td>10000</td>
<td>5000</td>
<td>7128-5000=2128</td>
<td>5000</td>
</tr>
</tbody>
</table>