Problem 1.

Find the present worth (at time 0) of the chrome plating costs in the cash flow diagram. Assume $i = 12\%$ per year.

\[ P = \left[2000\left(\frac{P}{A,12\%,6}\right) - 200\left(\frac{P}{G,12\%,6}\right)\right]\left(\frac{F}{P,12\%,1}\right) \]
\[ = \left[2000(4.1114) - 200(8.9302)\right](1.12) \]
\[ = $7209.17 \]

Solution:

Problem 2.

The multistate Powerball Lottery, worth $182$ million, was won by a single individual who had purchased five tickets at $1$ each. The individual was given two choices: Receive 26 payments of $7$ million each, with the first payment to be made now and the rest to be made at the end of each of the next 25 years; or receive a single lump-sum payment now that would be equivalent to the 26 payments of $7$ million each. If the state uses an interest rate of $4\%$ per year, the amount of the lump-sum payment is closest to

(a) Less than $109$ million (b) $109,355,000$ (c) $116,355,000$ (d) Over $117$ million

Solution:

\[ P = 7 + 7\left(\frac{P}{A,4\%,25}\right) \]
\[ = $116,354.7$ million \]

Answer is (c)

Problem 3.

The attendance at the annual El Paso Livestock Show and Rodeo has been declining for the past 5 years. The attendance was 25,880 in 2000 and 13,500 in 2004 (a 15\% per year decrease). If the average ticket price was $10$ per person over that time period, the present worth of the income in year 1999 (i.e., year 1999 is time 0) for the years 2000 through 2004 at an interest rate of 8\% per year is represented by which of the following equations?

(a) \[ P = 258,880\left\{1 - \left[(1 - 0.15)^5\right]\right\}\left(1 + 0.08\right)^5 \]
\[ = $1,322,123 \]
(b) \[ P = 258,880\left\{1 - \left[(1 - 0.15^5\right]\right\}\left(1 + 0.08\right)^5 \]
\[ = $672,260 \]
(c) \[ P = 258,880\left\{1 - \left[(1 + 0.15)^5\right]\right\}\left(1 + 0.08\right)^5 \]
\[ = $1,023,489 \]
(d) \[ P = 258,880\left\{1 - \left[(1 + 0.15)^5\right]\right\}\left(1 + 0.08\right)^5 \]
\[ = $761,390 \]

Solution:

Answer is (d)

Problem 4.

If $10,000$ is borrowed now at $10\%$ per year interest, the balance at the end of year 2 after payments of $3000$ in year 1 and $3000$ in year 2 will be closest to

(a) Less than $5000$ (b) $5800$ (c) $6100$ (d) More than $7000$

Solution:

\[ \text{Balance} = 10,000\left(\frac{F}{P,10\%,2}\right) - 3000\left(\frac{F}{A,10\%,2}\right) \]
\[ = 10,000(1.21) - 3000(2.10) \]
\[ = $5800 \]

Answer is (b)
Problem 5.
The annual deposit needed in years 1 through 5 to provide for an annual withdrawal of $1000 for 20 years beginning 6 years from now at an interest rate of 10% per year is closest to
(a) $1395  (b) $1457  (c) $1685  (d) More than $1700

Solution:
\[ 1000 = A(F/A,10\%,5)(A/P,10\%,20) \]
\[ 1000 = A(6.1051)(0.11746) \]
\[ A = $1394.50 \]
Answer is (a)

Problem 6.
If a company wants to have $100,000 in a contingency fund 10 years from now, the amount the company must deposit each year in years 6 through 9, at an interest rate of 10% per year, is closest to
(a) $19,588  (b) $20,614  (c) $21,547  (d) $22,389

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Solution:
\[ 100,000 = A(F/A,10\%,4)(F/P,10\%,1) \]
\[ 100,000 = A(4.6410)(1.10) \]
\[ A = $19,588 \]
Answer is (a)

Problem 7.
If a person begins saving money by depositing $1000 now and then increases the deposit by $500 each year through year 10, the amount that will be in the account in year 10 at an interest rate of 10% per year is closest to
(a) $21,662  (b) $35,687  (c) $43,872  (d) $56,186

Solution:
\[ F = [1000 + 1500(P/A,10\%,10) + 500(P/G,10\%,10)](F/P,10\%,10) \]
\[ = [1000 + 1500(6.1446) + 500(22.8913)](2.5937) \]
\[ = $56,186 \]
Answer is (d)

Problem 8.
Compute the present worth (year 0) of the following cash flows at \( i = 12\% \) per year.

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<thead>
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<th>Year</th>
<th>Amount, $</th>
<th>Year</th>
<th>Amount, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5000</td>
<td>8</td>
<td>700</td>
</tr>
<tr>
<td>1–5</td>
<td>1000</td>
<td>9</td>
<td>600</td>
</tr>
<tr>
<td>6</td>
<td>900</td>
<td>10</td>
<td>500</td>
</tr>
<tr>
<td>7</td>
<td>800</td>
<td>11</td>
<td>400</td>
</tr>
</tbody>
</table>

Solution:
\[ P = 5000 + 1000(P/A,12\%,4) + [1000(P/A,12\%,7) - 100(P/G,12\%,7)](P/F,12\%,4) \]
\[ = 5000 + 1000(3.0373) + [1000(4.5638) - 100(11.6443)](0.6355) \]
\[ = $10,198 \]

Problem 9    Effective interest Rate per six month: \( 14/2 = 7\% \)  (money compounding semiannually)

Problem 10    Effective interest rate is already given as 18% per year.