1.

\[ i = 8\% \]
\[ m = 12 \text{ (monthly)} \]
\[ n = 30 \text{ (years)} \]
\[ R = \$500 \]

\[ PW = R \left( \frac{P}{a_i}, \frac{i}{m}, mn \right) = \frac{500 \left( (1 + \frac{i}{12})^{n \cdot 12} - 1 \right)}{(\frac{0.08}{12})(1 + \frac{0.08}{12})^{30 \cdot 12}} \]

\[ PW = \$68,141.75 \]

So house price = \$68,141 + \$7000 = \boxed{\$75,141.75} \]

2.

\[ (a) \text{ } \$5000, 5 \text{ years} \]
\[ (b) \text{ } \$10,000, 10 \text{ years} \]

\[ i = 9\% \text{, Total Life = 40 years, } PW = ? \]

\[ (a) \quad PW = \left[ 5000 \left( \frac{A}{P}, 9\%, 5 \right) \right] \left[ \frac{P}{A}, 9\%, 40 \right] \]

\[ PW = 5000 \left( 0.12571 \right) \left( 10.757 \right) = \boxed{\$13,828} \]

\[ (b) \quad PW = \left[ 10,000 \left( \frac{A}{P}, 9\%, 10 \right) \right] \left[ \frac{P}{A}, 9\%, 40 \right] \]

\[ PW = 10,000 \left( 0.1558 \right) \left( 10.757 \right) = \boxed{\$16,722} \]

So recommend 5-year living

3.

For each option, where \( L = 795,000 \text{ m} \)

\[ PW = \text{Initial Cost} \times L + \text{Installation Cost} + \frac{P}{a_i} \times 0 + M \times \frac{L}{10,000} \]

\[ -SV \times \frac{P}{f} \]
Note, though, that each option has a different life-span, so we must look at the PW over 210 years if we want to use this method. A better way to compare the annualized cost of each option.

For the iron pipe:

\[
\text{Annual Cost} = \left( \frac{60}{10,000\text{m}} \right) (795,000\text{w}) + \left[ 105,000 + \frac{1.3}{3} \times 795,000 \text{w} \right] \left( \frac{a}{P}, 0.08, 7 \right) - \left[ 0.2 \times 3 \times 795,000 \right] \left( \frac{a}{P}, 0.08, 7 \right)
\]

\[= \$428,776.74\]

For the iron-alloy: \(\text{Annual Cost} = \$556,341.87\)

For the chrome-iron: \(\text{Annual Cost} = \$536,793.65\)

So the Iron-pipe is the best alternative.

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
<th>O&amp;M</th>
<th>Initial</th>
<th>Salvage</th>
<th>a/p</th>
<th>a/f</th>
<th>Total Annualized</th>
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<tbody>
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<td>2466000</td>
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<td>4080000</td>
<td>795000</td>
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<td>2385</td>
<td>4875000</td>
<td>954000</td>
<td>0.11683</td>
<td>0.03683</td>
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</tr>
</tbody>
</table>

4. FC = $15,000,000
   n = 20
   O&M = $200,000 + $100,000 each yr after yr. 1
   Price of oil = $20/barrel
5. There are lots of possible answers to this.

6. (a) In Pittsburgh/Allegheny County, 5% of houses have an elevated risk of lead poisoning; in Houston/Harris County, 1% of houses have an elevated risk of lead poisoning. Pittsburgh has a higher risk, possibly because it has a greater number of older homes, which were built when lead was still a common building material.

(b) Pittsburgh/Allegheny County ranks among the cleanest 20% of all counties in the U.S. for Superfund sites; Houston/Harris County ranks among the dirtier 30% of all counties in the U.S. for Superfund sites. Houston is clearly worse in terms of Superfund sites. This is probably because of the large presence of industries connected to petroleum extraction and processing.