**Linear Growth, Recursion and Slope**

**Preliminaries and Objectives**

**Preliminaries**
- Rates of Change

**Objectives**
- Understand the connection between recursive addition and the rate of change.

**Recursive Definition**

\[
\begin{align*}
P_{1970} &= 18,000 \\
P_{t+10} &= P_t + 4,000
\end{align*}
\]

\[
\begin{align*}
P_{1980} &= 18,000 + 4,000 = 22,000 \\
P_{1990} &= 22,000 + 4,000 = 26,000 \\
P_{2000} &= 26,000 + 4,000 = 30,000 \\
P_{2010} &= 30,000 + 4,000 = 34,000
\end{align*}
\]

**Example 1**

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>18,000</td>
</tr>
<tr>
<td>1980</td>
<td>22,000</td>
</tr>
<tr>
<td>1990</td>
<td>26,000</td>
</tr>
<tr>
<td>2000</td>
<td>30,000</td>
</tr>
<tr>
<td>2010</td>
<td>34,000</td>
</tr>
</tbody>
</table>

**Slope**

The slope of the line can be calculated as follows:

\[
slope = \frac{y_2 - y_1}{x_2 - x_1}
\]

Using the points (1970, 18,000) and (1980, 22,000):

\[
slope = \frac{22,000 - 18,000}{1980 - 1970} = \frac{4000}{10} = 400
\]