Section 1.2: Graphs

**Complete Graph**
A graph is a complete graph if it shows the basic shape of the graph and important points on the graph (including points where the graph crosses the axes and points where the graph turns) and suggests what the unseen portions of the graph will be.

**Graphing a Complete Graph**
Sketch the complete graph of the equation \( f(x) = x^3 - 3x \), using the fact that the graph has at most two turning points.

**Graphing a Complete Graph**
Sketch the graph of \( y = x^3 - 3x^2 - 13 \)

a. using the standard window. \([-10, 10] \times [-10, 10]\)

b. using the window \( x_{\text{min}} = -10, x_{\text{max}} = 10, y_{\text{min}} = -25, y_{\text{max}} = 10 \). \([-10, 10] \times [-25, 10]\)

Which graph gives a better view of the graph of the function?
Section 1.2 (cont.)

* What does it mean to "align data"?
  Add or subtract the same amount from every input value

* What does it mean to "scale data"?
  Multiply or divide every output value by the same amount

* What is a "complete graph"?
  A graph that shows all of the basic features, such as turning points and x- and y-intercepts.
Personal Savings

Using data from 1960 to 2009, the personal savings rate (as a percent of disposable income) of Americans can be modeled by the function

\[ y = 0.000469x^3 - 0.0387x^2 + 0.714x + 6.787 \]

where \( x \) is the number of years after 1960. (Source: U.S. Census Bureau)

a. Choose an appropriate window and graph the function with a graphing calculator. \([-20, 70] \times [-20, 20]\)

b. Use the model to estimate the personal savings rate in 2013. \( x = 2013 - 1960 \Rightarrow 53 \)

c. Use the graph to estimate the year in which the personal savings rate is a maximum.

b) \( y \approx 5.74\% \)

c) About 11.7 (or 12) years after 1960, or in 1972.
**Hotel Values** The following table gives the annual rental value of an average hotel room for the years 2000–2005.

<table>
<thead>
<tr>
<th>Year</th>
<th>Value per Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$73,978</td>
</tr>
<tr>
<td>2001</td>
<td>$70,358</td>
</tr>
<tr>
<td>2002</td>
<td>$68,327</td>
</tr>
<tr>
<td>2003</td>
<td>$68,197</td>
</tr>
<tr>
<td>2004</td>
<td>$71,691</td>
</tr>
<tr>
<td>2005</td>
<td>$74,584</td>
</tr>
</tbody>
</table>

(a) Let $x$ represent the number of years after 2000 and $y$ represent the value per room in thousands of dollars and sketch the scatter plot of the data.

(b) Graph the equation $y = 0.973x^2 - 4.667x + 73.950$ on the same axes as the scatter plot.

(Source: Pennsylvania State University)