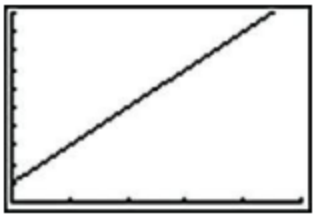
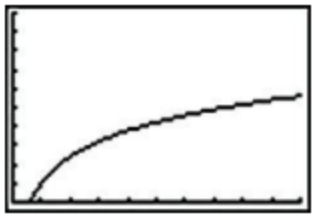
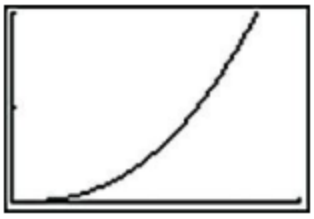
Linear: $y = a + bx$
Example: $y = 1 + 2x$



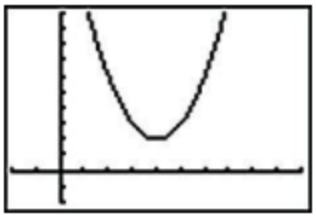
Logarithmic: $y = a + b \ln x$
Example: $y = 1 + 2 \ln x$



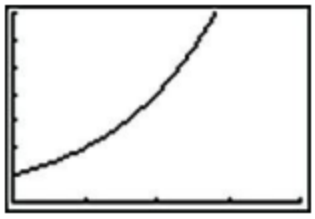
Power: $y = ax^b$
Example: $y = 3x^{2.5}$



Quadratic: $y = ax^2 + bx + c$
Example: $y = x^2 - 8x + 18$



Exponential: $y = ab^x$
Example: $y = 2^x$



Here are three basic rules for identifying a good mathematical model:

1. *Look for a pattern in the graph.* Use the sample data to construct a graph, such as those shown in the preceding examples. Compare the graph to the examples shown and identify the model that appears to be most similar.
2. *Compare values of R^2.* For each model being considered, use technology to find the value of the coefficient of determination R^2. Choose functions that result in larger values of R^2, because such larger values correspond to functions that better fit the observed sample data.
   - Don't place much importance on small differences, such as the difference between $R^2 = 0.984$ and $R^2 = 0.989$.
   - Unlike Section 10-5, we don't need to use values of adjusted R^2. Because the examples of this section all involve a single predictor variable, it makes sense to compare values of R^2.
   - In addition to R^2, another measure used to assess the quality of a model is the sum of squares of the residuals. See Exercise 18.
3. *Think.* Use common sense. Don't use a model that leads to predicted values that are unrealistic. Use the model to calculate future values, past values, and values for missing data, then determine whether the results are realistic and make sense. Don't go too far beyond the scope of the available sample data.

Example 1 Finding the Best Population Model

Table 10-7 lists the population of the United States for different years. Find a mathematical model for the population size, then predict the size of the U.S. population in the year 2020.

Table 10-7 Population (in millions) of the United States

Year	1800	1820	1840	1860	1880	1900	1920	1940	1960	1980	2000
Coded Year	1	2	3	4	5	6	7	8	9	10	11
Population	5	10	17	31	50	76	106	132	179	227	281