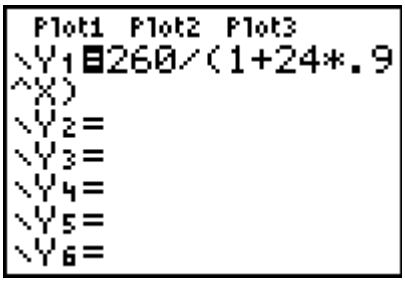
**Domain –** set of valid *x*-values (or inputs) for which there are corresponding *y*-values

**Range –** set of corresponding *y*-values (or outputs)

**Problem 1 – Sunflower Growth**

A sunflower plant is measured every day (*t*), for $t \geq 0$. The height of the plant in centimeters may be modeled by the following logistic function:

$$h(t) = \frac{260}{1 + 24(0.9)^t}$$




Graph the height of the sunflower over 100 days. Replace *t* with *x* and set an appropriate window.

- Determine the domain and range.

- What do the values for the domain and range tell you about the growth of the sunflower plant in this study?

**Problem 2 – Wind Turbine Power**

The equation, $P = kw^3$, relates the speed of the wind (*w*), in miles per hour to the power (*P*) produced by a wind turbine in watts. For a particular wind turbine, $k = 0.885$.

Graph the function that models power output for this turbine. Set an appropriate window.

- Why is it necessary to restrict the domain and range for this function?

- Identify the domain and range for the function modeling power output by a wind turbine.

**Problem 3 – Bald Eagle Population**

For a species protected from its natural enemies, the relationship between "Number of young produced" ($f(t)$) and "time since 1990" ($t$) can in general be modeled as an exponential function of this form: $f(t) = A \cdot 10^{k\,t}$.

Graph the function that models the given bald eagle population, $f(t) = 5.9 \cdot 10^{0.1141t}$.

Given that the exponential growth function models bald eagle data since 1990, when $t = 0$, determine the domain and range for this function.

**Additional Problems**

For each problem, graph the function given and then indentify the domain and range.

1. $f(x) = (x-2)^2 - 3$

   domain: range:

2. $f(x) = \dfrac{1}{\sqrt{x-5}}$

   domain: range:

3. $f(x) = \sin(x)$

   domain: range:

4. $f(x) = \log_{10} x$

   domain: range:

5. The relationship between the intensity of a light ($I$), and the distance from the source of the light ($d$), is given by the equation, $I = \dfrac{k}{d^2}$, where $k$ is a constant. For a given light bulb, $k$ = 0.7242. Graph the light intensity function and determine the domain and range.

   domain: range:

6. Why does the value $d$ = 0 not work for the intensity function?

7. How does the graph illustrate that $d$ = 0 is not valid for the intensity function?