Name: ___________________________ Date: ____________________

Learning Goal 0.1	Expectations for graphing from previous years.

1. For each of the following functions, determine

a. The type of function.

i. Radical

ii. Degree 3 polynomial

iii. Radical

iv. Rational

v. Exponential

b. The $x-$intercept(s).

i.
$$\sqrt{x+4}=0$$
$$x+4=0$$
$$x=-4$$

ii.
$$(x+1)^2(x-4)=0$$
$$x+1=0 \qquad x-4=0$$
$$x=-1 \qquad x=4$$

iii.
$$\sqrt{x+9}-1=0$$
$$\sqrt{x+9}=1$$
$$x+9=1$$
$$x=-8$$

iv.
$$\frac{6}{x+3}=0$$
$$\text{HA at } y=0$$

v.
$$3^x=0$$
$$\text{HA at } y=0$$

c. The $y-$intercept.

i.
$$y=\sqrt{0+4}$$
$$=\sqrt{4}$$
$$=2$$

ii.
$$y=(0+1)^2(0-4)$$
$$=(1)^2(-4)$$
$$=-4$$

iii.
$$y=\sqrt{0+9}-1$$
$$=\sqrt{9}-1$$
$$=3-1$$
$$=2$$

iv.
$$y=\frac{6}{0+3}$$
$$=\frac{6}{3}$$
$$=2$$

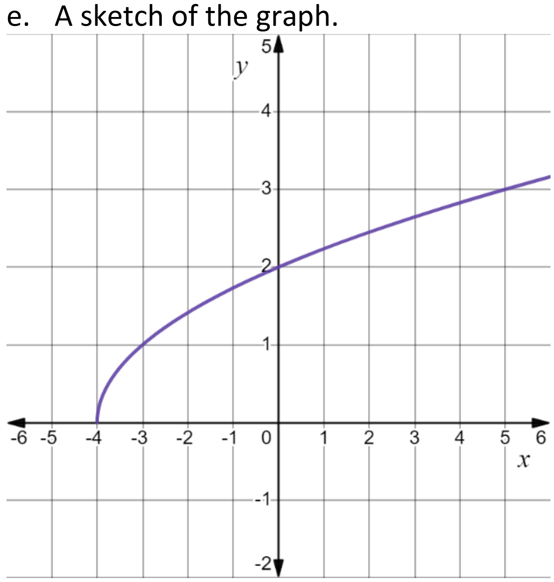
v.
$$y=3^0$$
$$=1$$

d. The domain and range.

i.
$$\{x|x\geq -4, x\in\mathbb{R}\}$$
$$\{y|y\geq 0, y\in\mathbb{R}\}$$

e. A sketch of the graph.

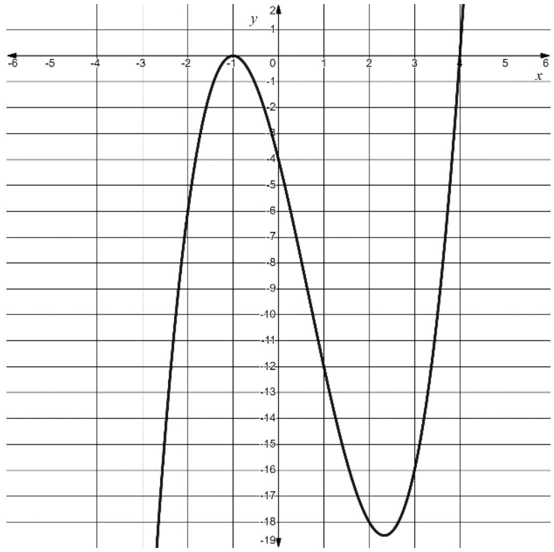
i.



ii.

$\{x|x \in \mathbb{R}\}$
$\{y|\ y \in \mathbb{R}\}$

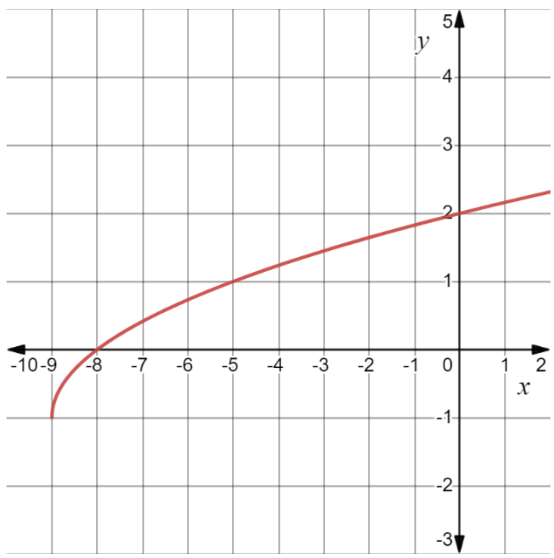
ii.



iii.

$\{x|x \geq -9, x \in \mathbb{R}\}$
$\{y|y \geq -1, y \in \mathbb{R}\}$

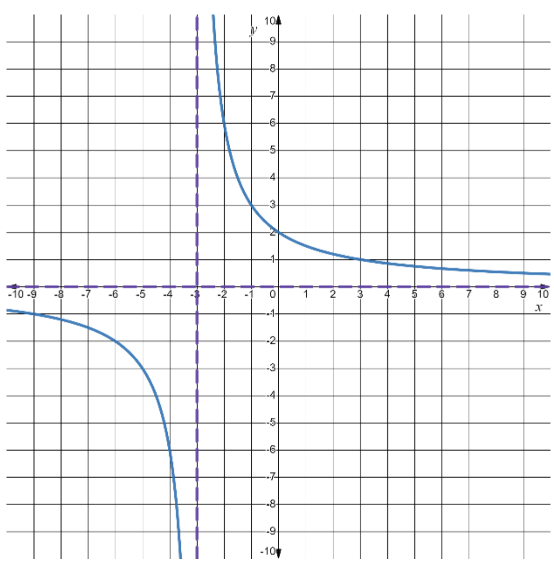
iii.



iv.

$\{x|x \neq -3, x \in \mathbb{R}\}$
$\{y|y \neq 0, y \in \mathbb{R}\}$

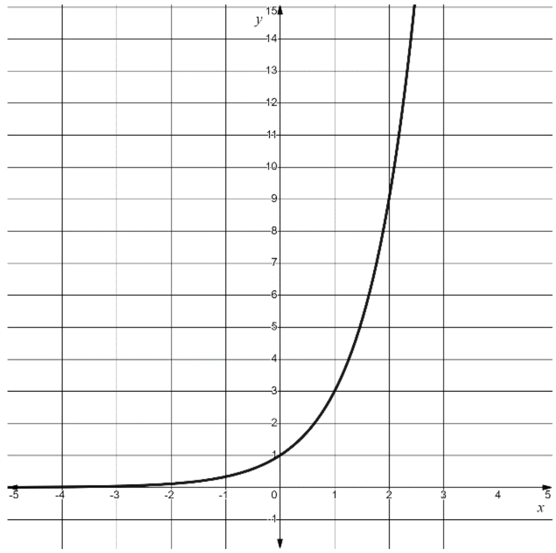
iv.



v.

$\{x|x \in \mathbb{R}\}$
$\{y|y \geq 0, y \in \mathbb{R}\}$

v.

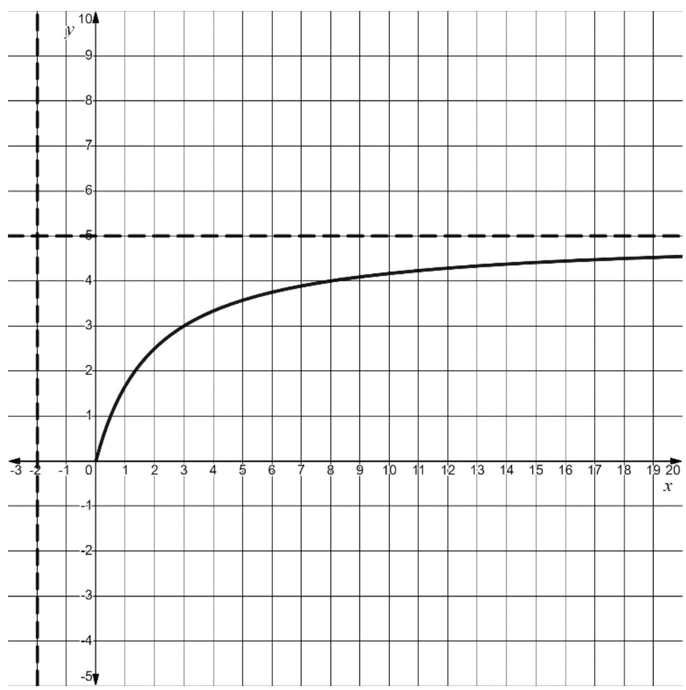


2. The following function is used in biology to give the growth rate of a population in the presence of a quantity of food x. This model is called 'Michaelis – Menton' kinetics.

$$y = \frac{Kx}{A + x}$$

   a. Graph the function for $K = 5$ and $A = 2$. What are the domain and range (consider the context of the problem)?

$\{x|x \geq 0, x \in \mathbb{R}\}$
$\{y|y \geq 0, y \in \mathbb{R}\}$



   b. What is the horizontal asymptote for this function? What do you think K represents?

$$y = 5$$

This represents the maximum growth rate of a population, no matter the availability of food.

c. Show that A represents the quantity of food for which the growth rate is at half its maximum.

Half the maximum growth rate is 2.5,

$$2.5 = \frac{5x}{2+x}$$
$$2.5(2+x) = 5x$$
$$5 + 2.5x = 5x$$
$$5 = 2.5x$$
$$x = 2 = A$$

3. In Canada, the inflation rate is about 1.8%. The value of A dollars in t years is given by the function

$$y = A(1.018)^t$$

a. What kind of model is this?

Exponential function.

b. Is the function increasing or decreasing?

Increasing function.

c. Suppose a car cost \$14 000 today. Use the model to estimate the cost in 20 years.

$$y = 14\,000\,(1.018)^{20}$$
$$= 20\,000.47$$

The car will cost \$20 000.47 in 20 years.

d. Find the cost of a \$50 textbook in 60 years.

$$y = 50(1.018)^{60}$$
$$= 145.83$$

The book will cost \$145.83 in 60 years.

4. During the early part of the 20^{th} century, the deer population in Arizona experienced a rapid increase because hunters reduced the number of predators. This depleted the food resources for the der and resulted in a population decline. For the period from 1905 to 1930, the deer population can be approximated by the following function where x is the time in years from 1905.

$$y = -0.125x^5 + 3.125x^4 + 4000$$

a. Use desmos to graph the function. What kind of function is this?

Degree 5 polynomial

b. Over what period of time was the population increasing? Decreasing?

The population increased from $1905 - 1925$.

The population decreased from $1925 - 1930$.

c. What was the maximum population of the deer? What year was that in?

104 000 deer in 1925.