

Write your questions and thoughts here!

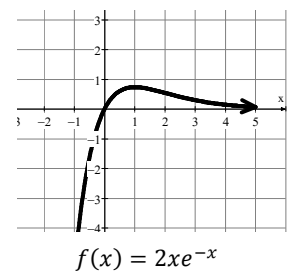
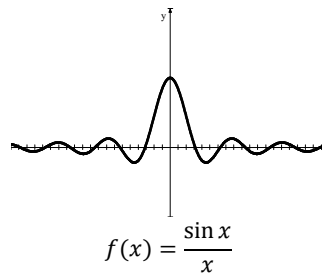
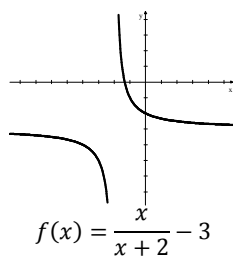
Horizontal Asymptotes vs. Vertical Asymptotes

Horizontal Asymptote	Vertical Asymptote
1.	1.
2.	2.
3.	3.

Limits Involving Infinity – H.A.**Horizontal Asymptotes**

$$\lim_{x \rightarrow -\infty} f(x) =$$

“The _____ side of the graph has a _____ that approaches...”



$$\lim_{x \rightarrow \infty} f(x) =$$

“The _____ side of the graph has a _____ that approaches...”

Finding the Horizontal Asymptote(s) Using a Graphing Calculator

$$1. f(x) = \frac{3x-4}{x+1}$$

$$2. f(x) = \frac{2x^2+3x-805}{3x^2-75x+1007}$$

$$3. f(x) = \frac{9}{1+e^{-x}} - 4$$

2.4 Limits to Infinity

Write your questions and answers here

Limits Involving Infinity – V.A.

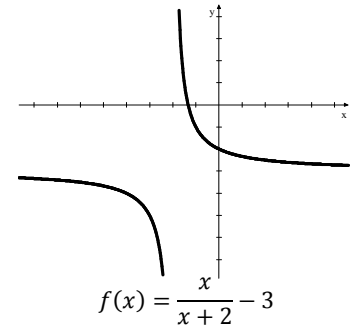
Vertical Asymptotes

$$\lim_{x \rightarrow c^-} f(x) =$$

“As x approaches c _____,
the graph goes _____”

$$\lim_{x \rightarrow c^+} f(x) =$$

“As x approaches c _____,
the graph goes _____”



Finding the behavior of a function around the vertical asymptote.

$$4. f(x) = \frac{7x-50}{7x^2-29x-150}$$

x	-4	-3.5	-3.1	-3.01	-3.001	-3	-2.999	-2.9	-2.5	-2	-1
$f(x)$											



$$5. f(x) = \frac{135x^3+408x^2+128x}{45x^2-434x-160}$$

x				10			
$f(x)$							

Now summarize what you learned!

Skillz Review: Write the function of each graph using $f(x) = \sqrt{x}$, $f(x) = x^3$, $f(x) = |x|$, or $f(x) = x^2$.

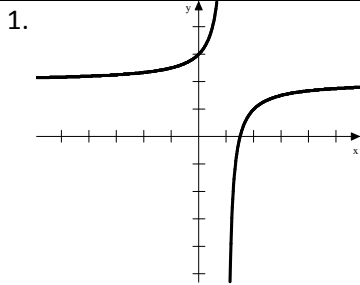
<p>1) $f(x) =$</p>	<p>2) $f(x) =$</p>	<p>3) $f(x) =$</p>	<p>4) $f(x) =$</p>
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2.4 Practice – Limits to Infinity

Name: _____

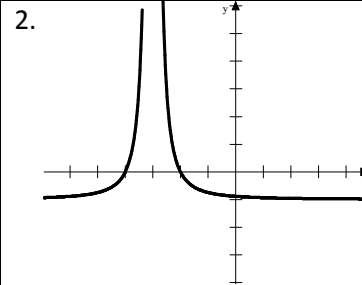
Pre-Calculus

For 1-2, use limit notation to represent the horizontal and vertical asymptotes. Then sketch them on the graph.



Horizontal Asymptote:

Vertical Asymptote:



Horizontal Asymptote:

Vertical Asymptote:

For 3-8, use a graphing calculator to find the horizontal asymptotes. Use limit notation to represent both the left and the right side end behavior.

3. $f(x) = \frac{2x-4}{x-8}$

4. $f(x) = \frac{2.6}{1+e^{-x}} - 2$

5. $f(x) = \frac{10x-13x^3}{39x^3+89x^2+x}$

6. $f(x) = \frac{5+x^2}{12-3x^2+9x}$

7. $f(x) = \frac{6}{1+e^{-x}} + 2$

8. $f(x) = \frac{3.5}{1+e^{-x}} + 1$

For 9-11, fill in the table and use that information to identify the vertical asymptote. Use limit notation to represent the behavior of the graph at the *vertical asymptote*.

9. $f(x) = \frac{5x^2-4x-1}{10x^2-38x-8}$

x	3	3.9	3.999	4	4.001	4.1	5
$f(x)$							

10. $f(x) = \frac{3x^2-20x-7}{9x^2+21x+6}$

x				-2			
$f(x)$							

11. $f(x) = \frac{x}{1-x}$

x				1			
$f(x)$							

Choose your own domain values!

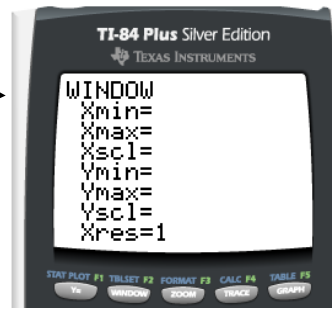
2.4 Application and Extension

Bunny Population

Beginning of Month	Number (in hundreds)
0	10
2	12
4	14
6	16
8	22
10	30
12	35
14	39
16	44
18	48
20	50
22	51

1. Mr. Sullivan decides to start raising bunnies. On the right is the population of these bunny rabbits over a 2-year period.

a. Graph the scatterplot with a “friendly” window and record it here.



b. Find a **logistic** regression model for the data. (Be patient, it will take the calculator a little extra time to calculate this.) Write out the logistic model below. Round all values to the nearest thousandth (three decimal places).

c. Find the limit of that model as time approaches infinity. Write it below using limit notation.

d. How does your answer from part c relate to the problem?

e. Provide a reasonable explanation why a population would have a growth limit instead of growing indefinitely like an exponential model.

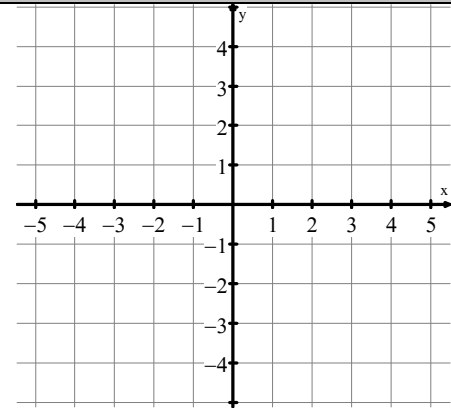
For 2 – 3, sketch a graph of a function $y = f(x)$ that satisfies the stated conditions.

2. Sketch (freehand) a graph of a function f that satisfies all of the following conditions. Include any asymptotes.

a. $\lim_{x \rightarrow 0} f(x) = \infty$

b. $\lim_{x \rightarrow \infty} f(x) = \infty$

c. $\lim_{x \rightarrow -\infty} f(x) = 2$



3. Sketch (freehand) a graph of a function f that satisfies all of the following conditions. Include any asymptotes.

a. $\lim_{x \rightarrow -\infty} f(x) = \infty$

b. $\lim_{x \rightarrow -3^+} f(x) = \infty$

c. $\lim_{x \rightarrow -3^-} f(x) = -\infty$

d. $\lim_{x \rightarrow \infty} f(x) = -1$

