Math 115

1. For each list of numbers below, find the "magic" number that each list is getting closer and closer to.
   - ½, -¼, ⅛, -1/16, ...
   - 0.3, 0.33, 0.333, 0.3333, …
   - 1, 1, 1, 1, …
   - 1, 2, 3, 4, …
   - 1, -1, 1, -1, 1, …
2. Write down 2-3 observations you can make about the lists of numbers above and what "magic" number they get closer and closer to.
3. Look at the following tables and analyze what is happening as x increases or decreases through the tables. Explain what you think is happening.

x	f(x)
5	3
9	5
15	6.1623
21	7
41	9

x	g(x)
1	0
2	20
3	102
4	312
5	740

x	h(x)
2	10
3	12
4	4
5	-20
6	-66

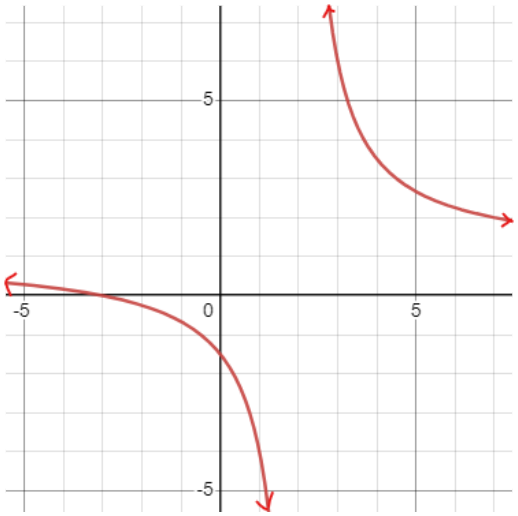
x	h(x)
-2	22
-3	60
-4	124
-5	220
-6	354

Practice with Limits Worksheet

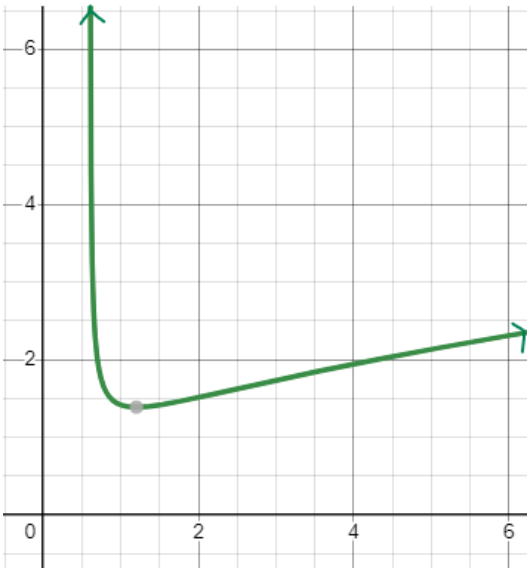
Math 120/125

1. Find the end-behavior limits for each function below.

$f(x) = \frac{x+3}{x-2}$

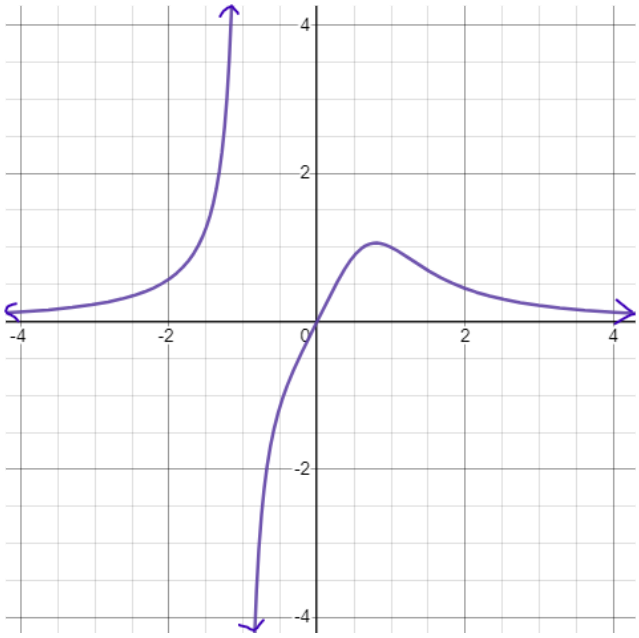


$f(x) = \frac{2x}{\sqrt{5x-3}}$

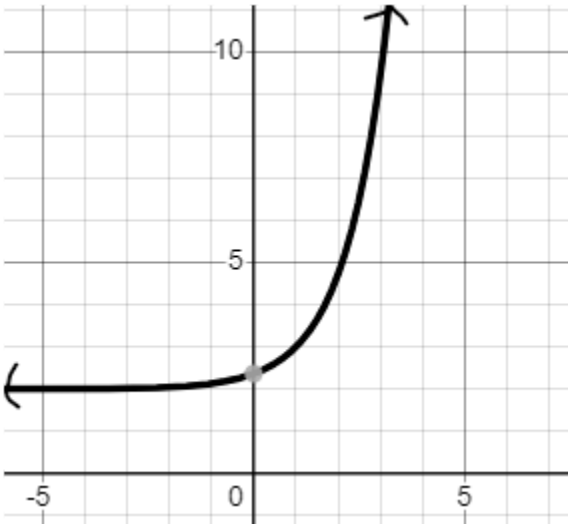


Practice with Limits Worksheet

$f(x) = \frac{2x}{x^3+1}$



$f(x) = e^{(x-1)} + 2$



2. Find the limits when $x \to \infty$ and when $x \to -\infty$. If you get super stuck, feel free to use DESMOS to draw the graph.

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

$f(x) = \frac{1}{2}x^3 + 2$

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

$f(x) = 4 - x^2$

$f(x) = 3^{-x}$

$f(x) = 4^{x-2} + 3$

$f(x) = 3^{x+5} - 1$

$f(x) = -(2^x + 6)$

$f(x) = log_2 x - 3$

Math 130

1. Using properties of limits, compute the limits below.

$\lim_{x \to 2} 4x^2 + 3$

$\lim_{x \to 1} \frac{x^2+x+2}{x+1}$

$\lim_{x \to -1} \frac{2x^2-x-3}{x+1}$

$\lim_{x \to -1} \frac{x^3+1}{x+1}$

$\lim_{x \to -3} \frac{x^2+x-6}{x+3}$

THEOREM 1.2 Properties of Limits

Let b and c be real numbers, let n be a positive integer, and let f and g be functions with the following limits.

$\lim_{x \to c} f(x) = L$ and $\lim_{x \to c} g(x) = K$

1. Scalar multiple:	$\lim_{x \to c} [b f(x)] = bL$
2. Sum or difference:	$\lim_{x \to c} [f(x) \pm g(x)] = L \pm K$
3. Product:	$\lim_{x \to c} [f(x)g(x)] = LK$
4. Quotient:	$\lim_{x \to c} \frac{f(x)}{g(x)} = \frac{L}{K}$, provided $K \neq 0$
5. Power:	$\lim_{x \to c} [f(x)]^n = L^n$

2. Find the limits when $x \to \infty$ and when $x \to -\infty$. If you get super stuck, feel free to use DESMOS to draw the graph.

$f(x) = \sqrt{x + 3}$

$f(x) = -3x(5x^2 - 6x - 4)$

$f(x) = 4^{x-2} + 3$

$f(x) = 3^{x+5} - 1$

$f(x) = -(2^x + 6)$

$f(x) = log_2(x - 7)$

$f(x) = log_2(x - 3) + 5$

3. Compute the limits below.

$\lim_{x \to 0} \frac{sin(x)}{x}$

$\lim_{x \to 0} x^2(1 - cos(\frac{1}{x}))$

$\lim_{x \to 0} x^2 sin(\frac{1}{x})$