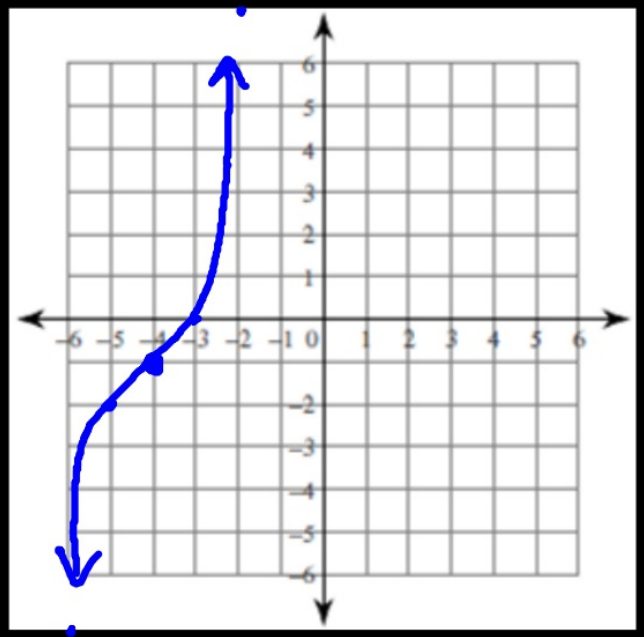
1) $f(x) = (x + 4)^3 - 1$



Type: Cubic

Transformation(s): Left 4, Down 1

Domain: $\mathbb{R}$ $(-\infty, \infty)$

Range: $\mathbb{R}$

Positive Interval(s): $(-3, \infty)$

Increasing Interval(s): $(-\infty, \infty)$

Unit 5:

Functions Part I

Domain Special Cases

&

Critical Points

Type
Transformations
Interval Notation

Domain
Range

Pos / Neg Intervals
Inc / Dec Intervals

Unit 5 Before Break

5 Main Types of Functions
Identify Transformations
State Domain and Range
Positive and Increasing Intervals
Graph and Write Equations
Interval Notation

What 2 functions that we have worked with have a domain that is not all real numbers?

Rational

$$y = \frac{1}{x}$$

cannot $\div 0$

Square Root

$$y = \sqrt{x}$$

cannot $\sqrt{\ }$ of a negative

That gives us 3 possibilities to focus on with domain questions. Domain Special Cases

1) $h(t) = \dfrac{3t^2}{t-1}$

Rational

$t - 1 \neq 0$

$+1 \quad +1$

$\boxed{t \neq 1}$

$(-\infty, 1) \cup (1, \infty)$

2) $g(x) = \sqrt{4x-1}$

Sq. Root

$4x - 1 \geq 0$

$+1 \quad +1$

$\frac{4x}{4} \geq \frac{1}{4}$

$\boxed{x \geq \frac{1}{4}}$

$\left[\frac{1}{4}, \infty\right)$

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

Both

$2x - 3 > 0$

$2x > 3$

$\boxed{x > 1.5}$

$(1.5, \infty)$

TO DO: State the domain of each function.

5A. $f(x) = \dfrac{5x - 2}{7x + 14}$

Rational

$7x + 14 \neq 0$

$7x \neq -14$

$\boxed{x \neq -2}$

$(-\infty, -2) \cup (-2, \infty)$

5B. $h(x) = \sqrt{a - 4}$

Sq. Root

$a - 4 \geq 0$

$\boxed{a \geq 4}$ $[4, \infty)$

5C. $g(x) = \dfrac{8x}{\sqrt{-2x + 6}}$

Both

$-2x + 6 > 0$

$-2x > -6$

$\boxed{x < 3}$ $(-\infty, 3)$

CRITICAL POINTS

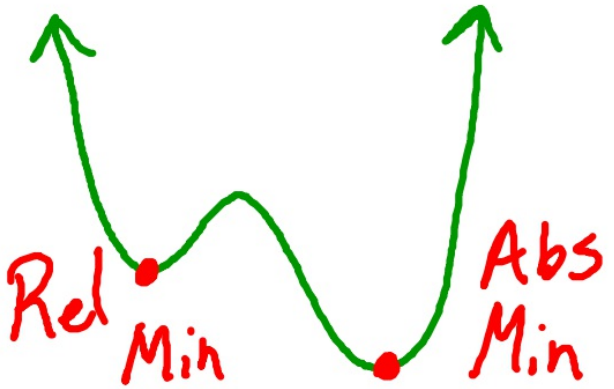
Extrema

Relative Maximum - highest point in an area

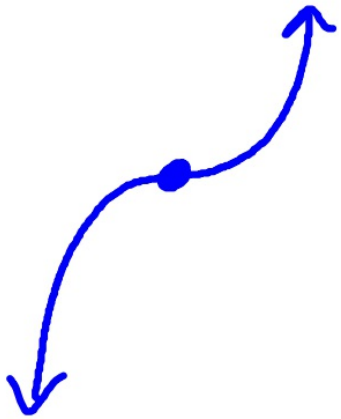
Absolute Maximum - highest point for a graph

Relative Minimum - lowest point in an area

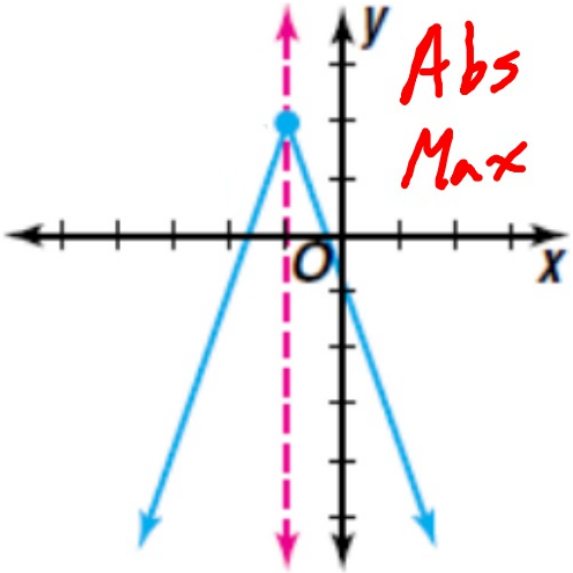
Absolute Minimum - lowest point for a graph

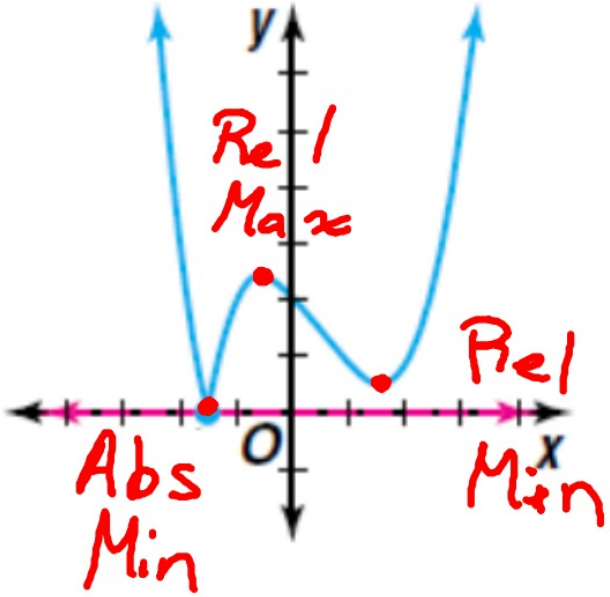


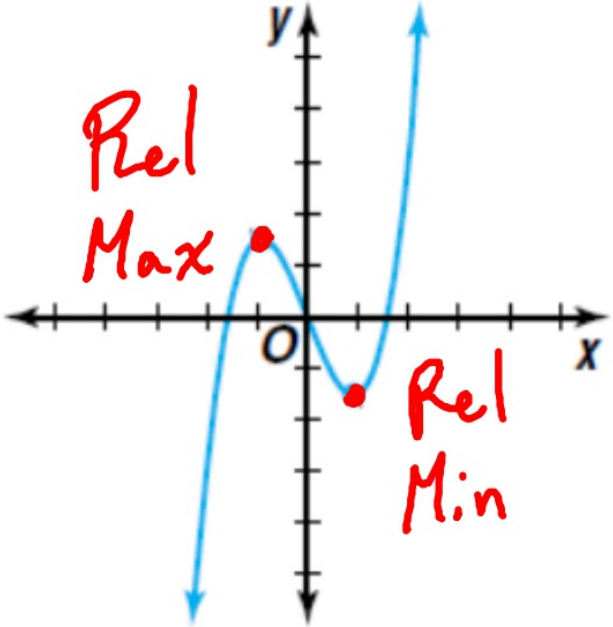
Point of Inflection - curve changes but graph continues increasing or decreasing



Identify Extrema







End Behavior

Notation:

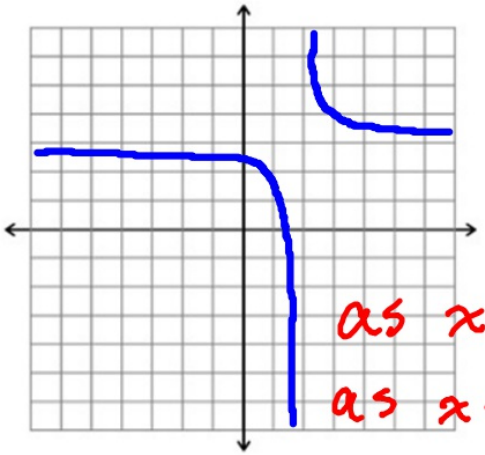
left? → as $x \to -\infty$, $f(x) \to$ ____

right? → as $x \to \infty$, $f(x) \to$ ____

End Behavior describes the function at the "edges."

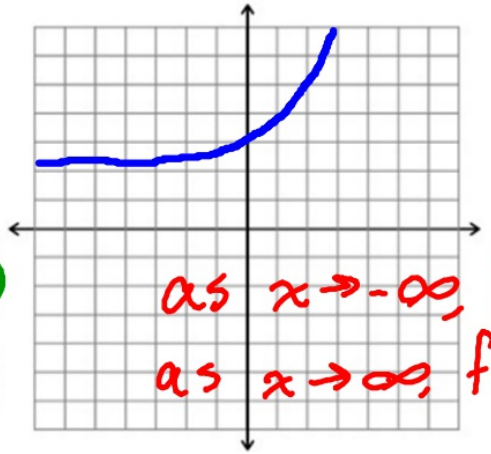
Simply look to the left edge of the graph and describe what is happening to the y.

Then do the same for the right side.



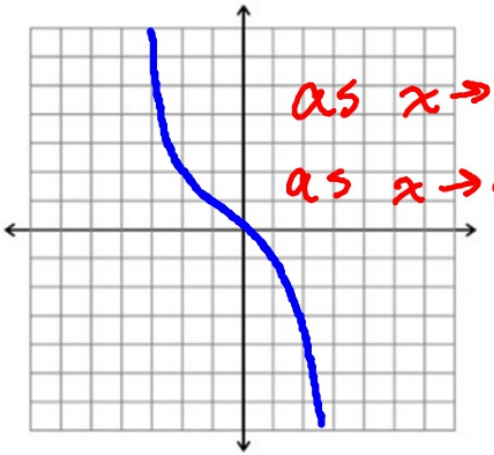
as $x \to -\infty$, $f(x) \to 3$

as $x \to \infty$, $f(x) \to 3$



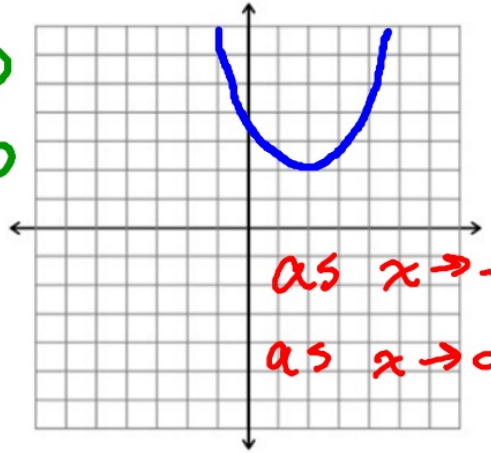
as $x \to -\infty$, $f(x) \to 2$

as $x \to \infty$, $f(x) \to \infty$



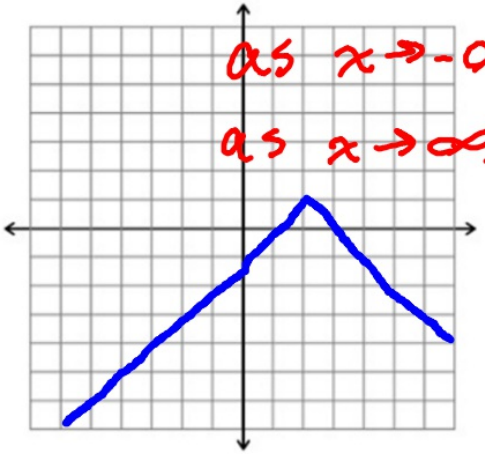
as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to -\infty$



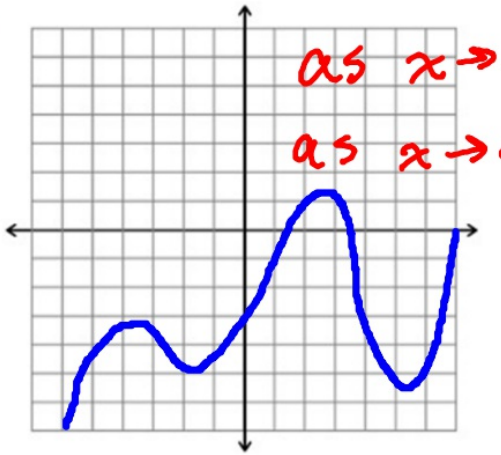
as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to \infty$



as $x \to -\infty$, $f(x) \to -\infty$

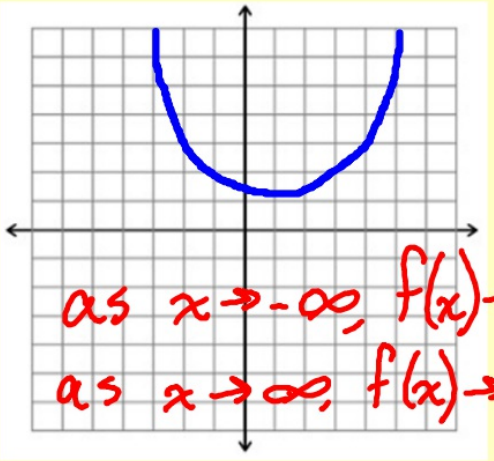
as $x \to \infty$, $f(x) \to -\infty$



as $x \to -\infty$, $f(x) \to -\infty$

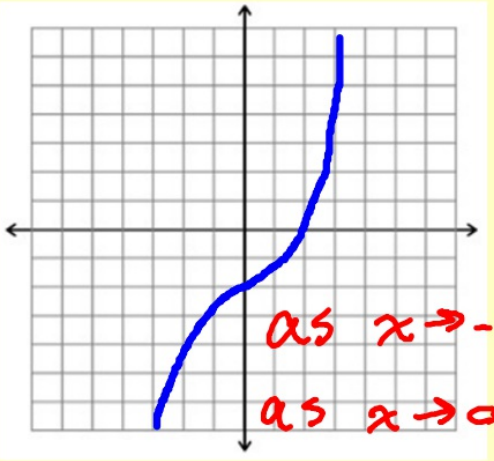
as $x \to \infty$, $f(x) \to \infty$

Determine the end behavior from a graph. But We Will Focus on 4 Possibilities



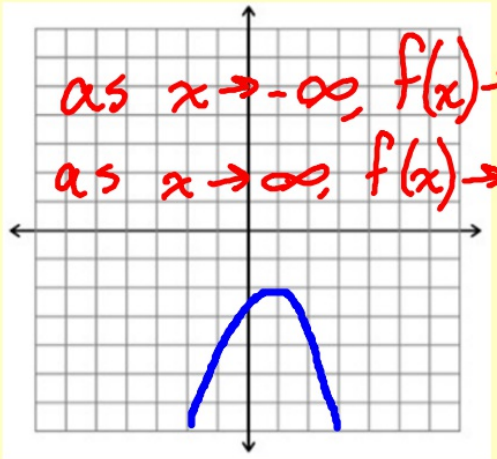
as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to \infty$



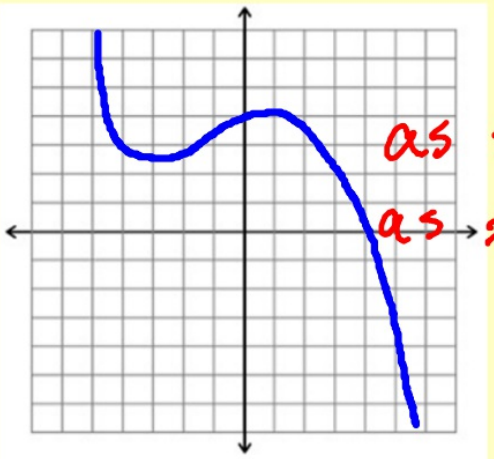
as $x \to -\infty$, $f(x) \to -\infty$

as $x \to \infty$, $f(x) \to \infty$



as $x \to -\infty$, $f(x) \to -\infty$

as $x \to \infty$, $f(x) \to -\infty$



as $x \to -\infty$, $f(x) \to \infty$

as $x \to \infty$, $f(x) \to -\infty$

WB 505 Wed

(Domain Special Cases)

WB 506 Thu

Like #4

$$\frac{4}{(x-7)(2x+10)}$$

$x-7\neq 0$

$x\neq 7$

$2x+10\neq 0$

$2x\neq -10$

$x\neq -5$

$$(-\infty,-5)\cup(-5,7)\cup(7,\infty)$$