# Happy Friday, September 16th!

Do Now:

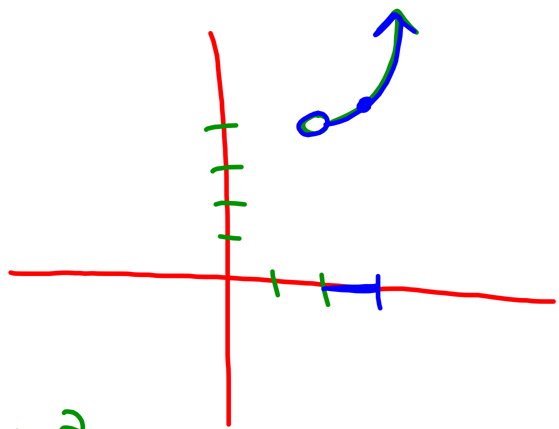
1) Look over your test, please no pictures (feel free to write things down)! Mark gradesheet.

2) Name 5 values that are in this interval: (-2,1]

$(2,\infty)\cup(-3,\infty)$


$1, 0, -1, \frac{1}{2}, \frac{1}{3}, -\frac{1}{3}, -\frac{1}{8}$

Sep 16-8:05 AM



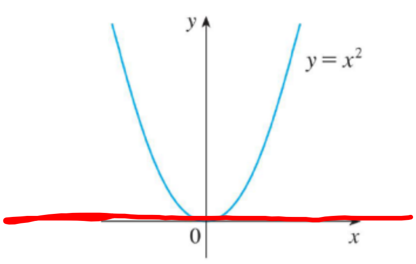
$\begin{cases} x^2 & x>2 \end{cases}$

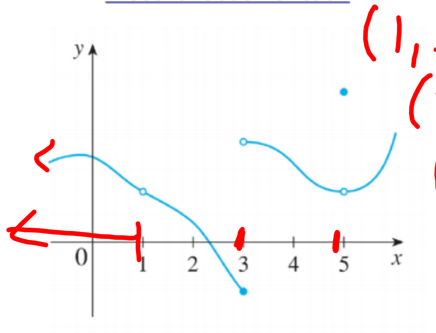
3

Sep 16-12:20 PM

## Continuity/Discontinuity

Continuity - A function is continuous at a point if the graph does not come apart at that point. (you can trace the graph without lifting your pencil) $(-\infty, \infty)$



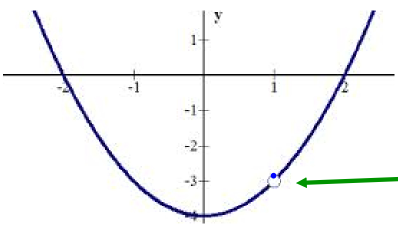

$(-\infty, 1)$
$(1, 3]$
$(3, 5)$
$(5, \infty)$

Sep 10-7:55 PM

Discontinuity - The x-value(s) where the graph "breaks" (where you need to pick up your pencil).

Removable discontinuity - A discontinuity you could repair (remove) by plugging in the hole.

at $X = 1$

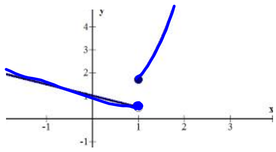


Find the discontinuity: $f(x) = \dfrac{x^2 - 4}{x + 2}$

Sep 10-8:00 PM

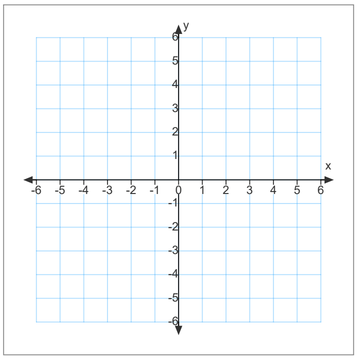
Jump Discontinuity - (non removable discontinuity) A jump in the function making it impossible to fix the discontinuity by plugging in the hole. X = 1

(If you "plug it in" won't be a function)



Draw the piecewise graph and decide if there is a jump discontinuity.

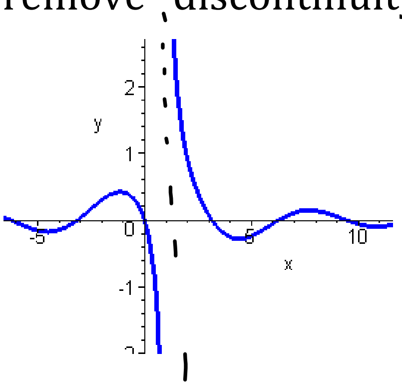
$$f(x) = \begin{cases} x^2 - 2x & for \quad x < 1 \\ 2x - 3 & for \quad x \geq 1 \end{cases}$$



Sep 10-8:04 PM

Infinite Discontinuity - Must jump over a vertical asymptote... can't place a point anywhere to "remove" discontinuity.

X = 1



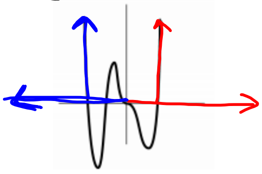

Graph the function and locate the infinite discontinuity

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

Sep 10-8:13 PM

## End behavior

$f(x) = x^6 + 5x^5 - x^4 - 21x^3$

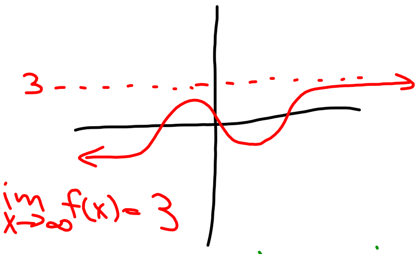


As x gets really big, what happens?

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

As x gets really small, what happens?

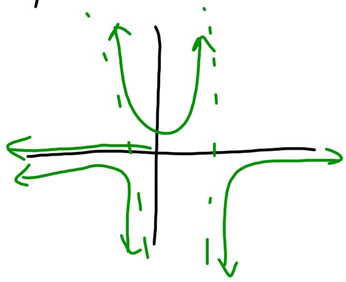
$\lim_{x\to-\infty} f(x) = \infty$




$\lim_{x\to\infty} f(x) = 3$

$\lim_{x\to\infty} f(x)$

$\lim_{x\to-\infty} f(x)$



Sep 16-8:19 AM

Graph the following and describe the end behavior:

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

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

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

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

$g(x) = 4x^2 + 6$

$h(x) = x^4 + 2x - 6$

What do these have in common? What can you conjecture about this type of function?

Sep 15-3:52 PM

Graph the following and describe the end behavior:

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

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

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

$h(x) = -5x^4 + 2x - 6$

What do these have in common? What can you conjecture about this type of function?

Sep 15-3:55 PM

Graph the following and describe the end behavior:

$f(x) = x^3 + 3x^2 - 6$

$f(x) = 3x^5 - 2x^3 + 5$

$g(x) = 2x + 6$

$h(x) = 5x^7 + 2x - 6$

What do these have in common? What can you conjecture about this type of function?

Sep 15-3:55 PM

Graph the following and describe the end behavior:

$f(x) = -x^3 + 3x^2 - 6$

$f(x) = -3x^5 - 2x^3 + 5$

$g(x) = -2x + 6$

$h(x) = -5x^7 + 2x - 6$

What do these have in common? What can you conjecture about this type of function?

Sep 15-3:55 PM

| | Leading coefficient is positive | Leading coefficient is negative |
|---|---|---|
| Leading degree is even | $f(x)=x^2$ $\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = \infty$ | $-\infty$ $-\infty$ |
| Leading degree is odd | $f(x)=x^3$ $\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = -\infty$ | $\lim_{x\to\infty} f(x) = -\infty$ $\lim_{x\to-\infty} f(x) = \infty$ |

Sep 15-3:58 PM

# Ok, so what about these?

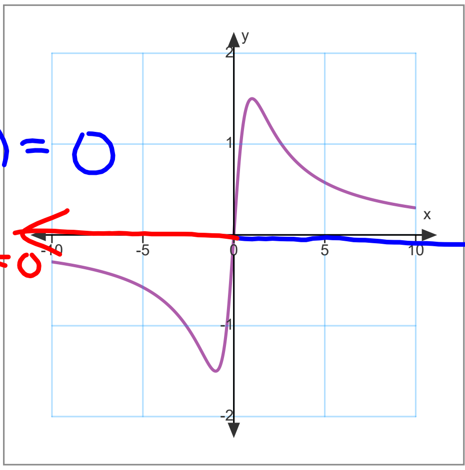
$\lim_{x\to\infty} f(x) = \infty$

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

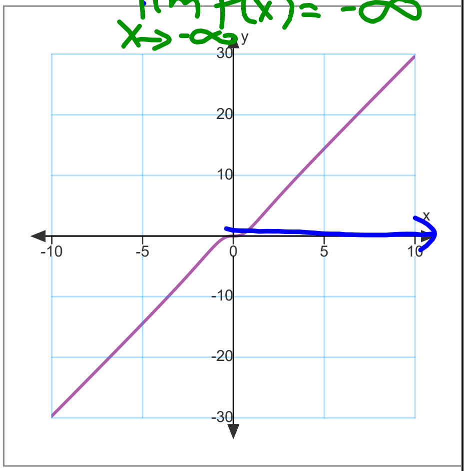
$$\frac{3x}{x^2+1}$$

$\lim_{x\to\infty} g(x) = 0$

$\lim_{x\to-\infty} g(x) = 0$




$$\frac{3x^3}{x^2+1}$$




Sep 16-8:19 AM

# Exit Slip:

Describe the end behavior of

$$f(x) = \frac{4x}{x^2+1}$$

Homework: 12-19 on the review.

Sep 16-8:26 AM