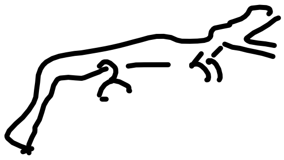
Always & Nevah! situations

$|☺| \ge 0$ always

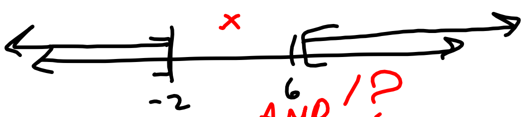
$|☹| < 0$ nevah!



$\boxed{|x-2| \le -4}$ → Nevah!

$x-2 \le -4$ and $x-2 \ge 4$

$x \le -2$ and $x \ge 6$

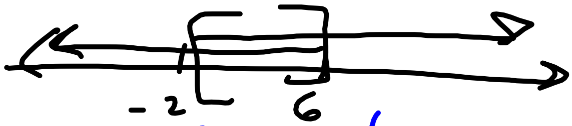


AND!?
Nevah!

AND Needs overlap between both lines.

$\boxed{|x-2| \ge -4}$ → Always!

$x \ge -2$ OR $x \le 6$



Always!

"OR" just needs one line.

Polynomial Division #9 on Old 099 Final.

$$
\begin{array}{r}
31\ r4 \\
9\overline{)283} \\
-270 \\
\hline
13 \\
-9 \\
\hline
4
\end{array}
$$

For Polynomials.

$$\frac{283}{9} = 31 + \frac{4}{9}$$

More useful for Rational Functions

This says

$$\boxed{283 = 9 \cdot 31 + 4}$$

Dividend = Divisor · Quotient + Remainder

This statement is called the "Division Algorithm," even though, to ME, it's the RESULT of the division algorithm.

#10

$$
\begin{array}{r l}
 & 3x^2 + 1 \quad r\ 7x-9 \\
x^2-2 \,\big) & 3x^4 + 0x^3 - 5x^2 + 7x - 11 \\
 & -(3x^4 \qquad\quad -6x^2) \\
\hline
 & \qquad\qquad x^2 + 7x - 11 \\
 & \qquad -(x^2 \qquad\quad -2) \\
\hline
 & \qquad\qquad\qquad 7x - 9
\end{array}
$$

$$\frac{3x^4}{x^2} = 3x^2$$

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

$$3x^4 - 5x^2 + 7x - 11 = (x^2-2)(3x^2+1) + 7x - 9 \qquad \frac{x^2}{x^2}$$

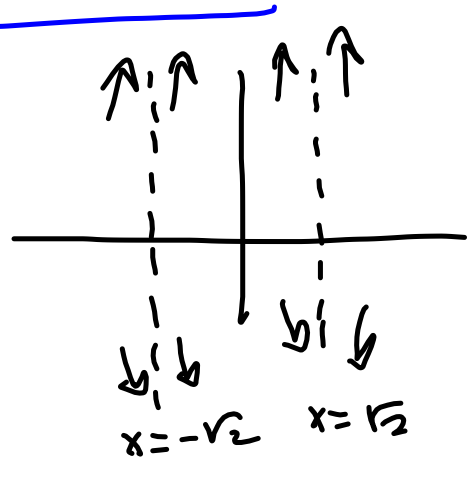
when we look at Rational Functions in C3, this will help us find oblique asymptote for

$$f(x) = \frac{3x^4 - 5x^2 + 7x - 11}{x^2-2}$$

$$= 3x^2 + 1 + \frac{7x-9}{x^2-2}$$

is not defined at $x = \pm\sqrt{2}$

Future idea:



$$x^2 - 2 = 0$$
$$x^2 = 2$$
$$|x| = 2$$
$$x = \pm\sqrt{2}$$

Farther away from blowups at $x = \pm\sqrt{2}$, the more it looks like $y = 3x^2 + 1$.

Synthetic Division only for Divisor of the form $x - c$

$$\frac{3x^4 - 2x^3 - 5x^2 + 7x - 11}{x - 2} \qquad c = 2$$

$$\begin{array}{r|ccccc} c & a & b & c & d & e \end{array}$$

We find $f(2)$ from this.

$$\begin{array}{r|ccccc} 2 & 3 & -2 & -5 & 7 & -11 \\ & & 6 & 8 & 6 & 26 \\ \hline & 3 & 4 & 3 & 13 & 15 \\ & x^3 & x^2 & x^1 & c & r \end{array}$$

$$3x^4 - 2x^3 - 5x^2 + 7x - 11 = (x-2)(3x^3 + 4x^2 + 3x + 13) + 15$$

what's $f(2)$?

$f(2) = 15$

Now we use synthetic division to find $f(3)$:

we're dividing by $x-3$ here.

$$\begin{array}{r|rrrrr} 3 & 3 & -2 & -5 & 7 & -11 \\ & & 9 & 21 & 48 & 165 \\ \hline & 3 & 7 & 16 & 55 & 154 \end{array}$$

This says $f(3) = 154$

check.

$3(3)^4 - 2(3)^3 - 5(3)^2 + 7(3) - 11$

$= 243 - 54 - 45 + 21 - 11$

$= 243 - 99 + 10$

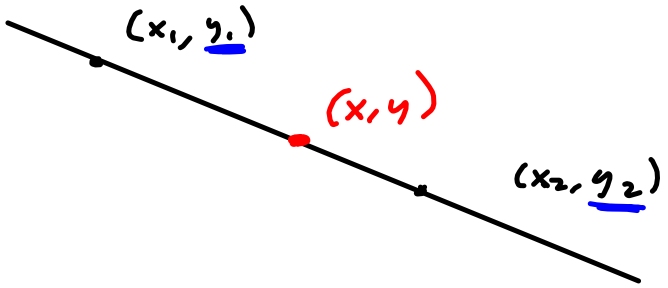
$= 243 - 89$

$=$

$$\begin{array}{r} 243 \\ -\ 89 \\ \hline 154 \end{array}$$

Aug 22-8:40 AM

Lines



$$\text{Slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = m \longrightarrow$$

$$y_2 - y_1 = m(x_2 - x_1)$$

If (x, y) is ANY point on the line, then it also satisfies this relationship.

$$y - y_1 = m(x - x_1)$$ Point-Slope Form

$$\boxed{y = m(x - x_1) + y_1}$$ is nicer, because y is by itself.

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121-G11
1.1

$(x_1, y_1) = (-2, 1)$, $(1, 3) = (x_2, y_2)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-1}{1-(-2)} = \frac{2}{3} = m$$

$$y = m(x - x_1) + y_1$$

$$y = \frac{2}{3}(x - (-2)) + 1$$ DONE !

"an equation"

Due Monday The test !

∴ Wednesday §1.1 is on website.