$|3x-2| = 5$

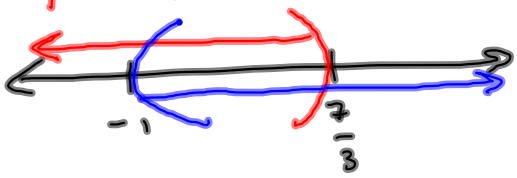
$3x-2=5$ OR $3x-2=-5$

$\left\{\frac{7}{3}, -1\right\}$

$|3x-2| < 5$

$3x-2 < 5$ AND $3x-2 > -5$

$\{x \mid x < \frac{7}{3}$ and $x > -1\}$



$x \in (-1, \frac{7}{3})$

$|3x-2| > 5$

$3x-2 > 5$ OR $3x-2 < -5$

$\{x \mid x > \frac{7}{3}$ OR $x < -1\}$

$(-\infty, -1) \cup (\frac{7}{3}, \infty)$

$|3x-2| < -5$ $\emptyset$

$|3x-2| \geq 0$ $\mathbb{R}$

$|3x-2| > -5$ $\mathbb{R}$

$|3x-2| \leq 0 \Rightarrow 3x-2=0$

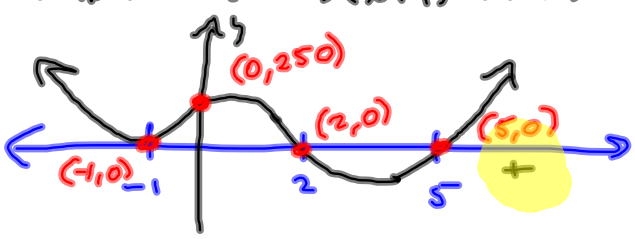
$3x-2 \leq 0$ and $3x-2 \geq -0$

$3x \leq 2$ $\quad 3x \geq 2$

$x \leq \frac{2}{3}$ AND $x \geq \frac{2}{3}$

$\boxed{x = \frac{2}{3}}$ $\quad \left\{\frac{2}{3}\right\}$

Graph $(x-2)(x+1)^2(x-5)^3$



1 test value at most, is all you need

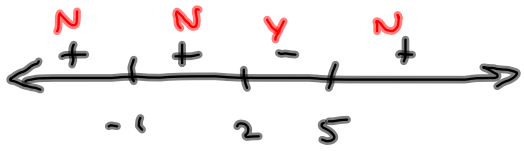
$x=6$

$(6-2)(6+1)^2(6-5)$

$x=0$ for y-int:

$(-2)(1)^2(-5)^3 = 250$

Solve $(x-2)(x+1)^2(x-5)^3 \leq 0$



Means "$-$" (or zero)

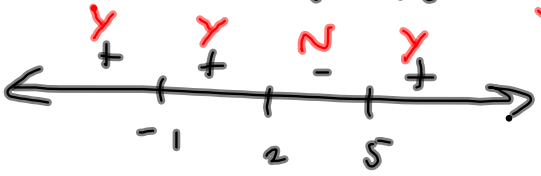
<0 GOOD

$=0$ GOOD

$[2,5] \cup \{-1\}$

Find the domain of $f(x)=\sqrt{(x-2)(x+1)^2(x-5)^3}$

Solve: $(x-2)(x+1)^2(x-5)^3 \geq 0$



Want "$+$" (or zero)

>0 GOOD

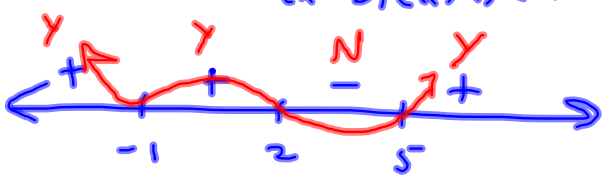
$=0$ ..

$(-\infty,-1] \cup [-1,2] \cup [5,\infty)$

$(-\infty,2] \cup [5,\infty)$

Find the Domain: $\ln\left((x-2)(x+1)^2(x-5)^3\right)$

Solve: $(x-2)(x+1)^2(x-5)^3 > 0$



$(-\infty,-1)\cup(-1,2)\cup(5,\infty)$

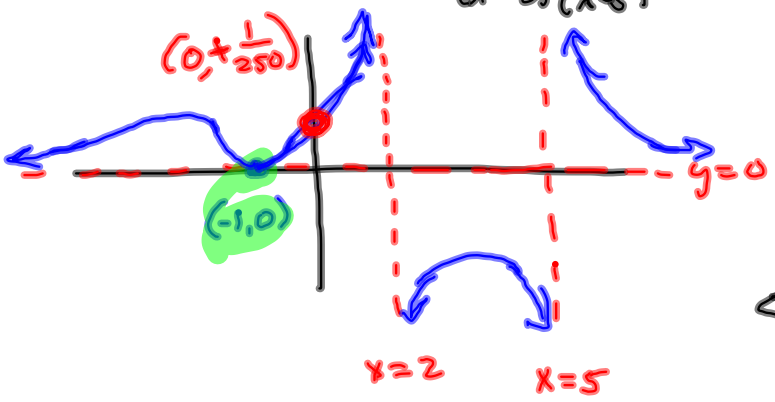
$\frac{x^2}{(x)(x^3)} = \frac{x^2}{x^4} = \frac{1}{x^2}$

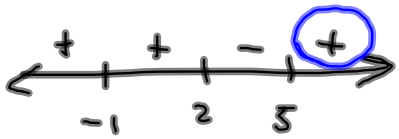
Graph $f(x) = \frac{(x+1)^2}{(x-2)^1(x-5)^3}$

$D = \{x \mid x \neq 2, 5\}$

V.A.: $x=2$, $x=5$

H.A.: $y=0$ (PROPER)





Solve in 3 ways: $x^2 - 4x - 5 = 0$

(1) Factoring
(2) Quadratic Formula
(3) Completing the square

(1) $(x-5)(x+1) = 0$

$x \in \{-1, 5\}$

$(x-5)(x+1) =$
$x^2 + x - 5x - 5 = x^2 - 4x - 5$

(2) $a = 1, b = -4, c = -5$

Discriminant $= b^2 - 4ac = (-4)^2 - 4(1)(-5)$

$= 16 + 20$

$= 36 \rightarrow \pm\sqrt{36} = 6$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} = \frac{-(-4) \pm 6}{2(1)} = \frac{4 \pm 6}{2}$$

$$= \frac{4}{2} \pm \frac{6}{2} = 2 \pm 3 \begin{matrix} \nearrow 5 \\ \searrow -1 \end{matrix} \quad x \in \{-1, 5\}$$

(3) $x^2 - 4x - 5 = 0$

$x^2 - 4x = 5$

$x^2 - 4x + 2^2 = 5 + 4$

$(x-2)^2 = 9$

$x - 2 = \pm\sqrt{9} = \pm 3$

$x = 2 \pm 3$, etc.

$-2x+4 = -2(x-2)$

stages:

$x \longrightarrow -2x \longrightarrow -2(x-2)$

$g(x) = 2 \cdot 3^{-2x+4} - 5$

$f(x) = 3^x \longrightarrow f(-2x) = 3^{-2x}$ $\quad (x,y) \longrightarrow (-\frac{1}{2}x, y)$

$-\frac{1}{2}$ times x

$\longrightarrow f(-2(x-2)) = 3^{-2(x-2)}$ RIGHT 2

$(x,y) \longrightarrow (x+2, y)$

$\longrightarrow 2 \cdot f(-2(x-2)) = 2 \cdot 3^{-2(x-2)}$ 2 times y

$(x,y) \longrightarrow (x, 2y)$

$\longrightarrow 2 \cdot f(-2(x-2)) - 5 = 2 \cdot 3^{-2(x-2)} - 5 = g(x)$

Down 5

$(x,y) \longrightarrow (x, y-5)$

NOBODY can do

3^x to 3^{-2x+4} in one step.