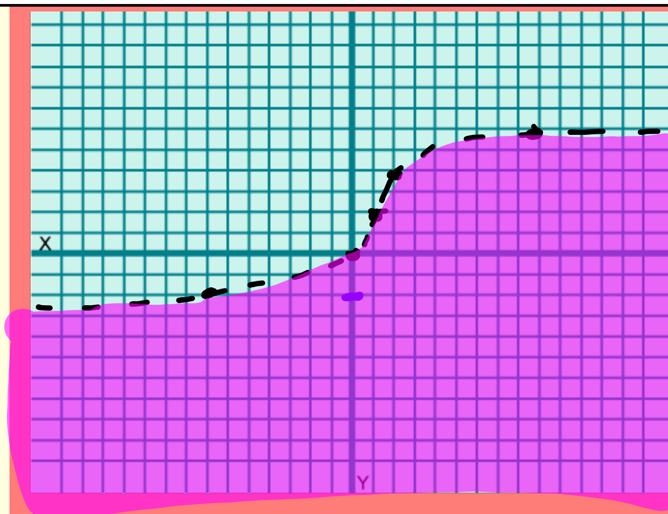
Graphing Inequalities

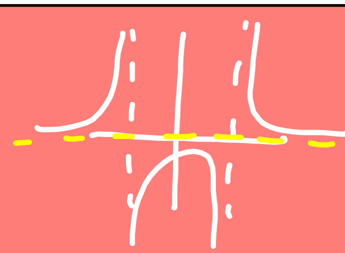
$$y < 2\sqrt[3]{x-1} + 2$$

below graph

x	y
0	0
1	~~1~~ 2
8	~~2~~ 4



ASYMPTOTES



Vertical Asymp

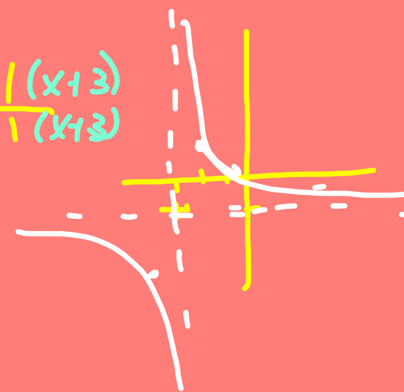
where denom = 0

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

$$y = \frac{2-x-3}{x+3}$$

$$y = \frac{-x-1}{x+3}$$

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



Horiz Asymp

Use highest power of x in problem - take that term from numerator & denominator

$$y = \frac{3x^2+1}{2x^2-8} \qquad \frac{3\cancel{x^2}}{2\cancel{x^2}} \qquad \boxed{y = 3/2}$$

$$y = \frac{2x^2-3x+5}{4x^3+7} \qquad \frac{0\cancel{x^3}}{4\cancel{x^3}} = 0 \qquad \boxed{y = 0}$$

$$y = \frac{4x^2-7}{3x+1}$$

$$\frac{4\cancel{x^2}}{0\cancel{x^2}}$$ no horiz asymp.

Find all asymptotes

$$f(x) = \frac{3x+7}{x^2-3x-28}$$

Vertical

$x^2-3x-28=0$

1 28
2 14
4 7

$(x+4)(x-7)=0$

$x+4=0 \quad x-7=0$

$x=-4 \quad x=7$

Horiz

$\frac{0\cancel{x^2}}{1\cancel{x^2}}=0$

Vertical

$x=-4$

$x=7$

Horiz.

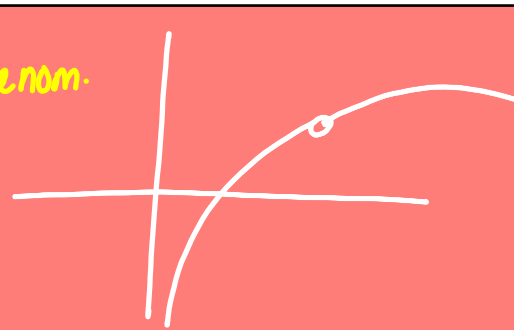
$y=0$

Holes — When terms cancel from num + denom.

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

$$= \frac{\cancel{(x+2)}(x-2)}{(x+1)\cancel{(x+2)}}$$

Hole at $x=-2$



Slant Asymptotes (Oblique)

occur when highest power in the numerator is one greater than the highest power in the denominator.

$$\boxed{y = mx + b}$$

$$f(x) = \frac{4x^2 + 7}{2x - 1}$$

To find: Use long division

$$\begin{array}{r|l} & 2x + 1 \\ \hline 2x - 1 & 4x^2 + 0x + 7 \\ & -\cancel{4x^2} + 2x \\ \hline & \quad\quad 2x + 7 \end{array}$$

Change signs

$$\boxed{y = 2x + 1}$$