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

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

$x \neq 0$

$x+3=0$

$-3 \quad -3$

$x \neq -3$

vertical asymptotes: $x = 0, x = -3$

holes — no holes

horizontal asymptotes

limits to infinity

Domain

$x \neq 0, x \neq -3$

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

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

$$\lim_{x \to \infty} \frac{1}{x} \qquad \frac{1}{\infty} = 0$$ horizontal asymptote

$\frac{3x^2}{4x^2}$ = highest degree terms same, horizontal asymptote is equal to the ratio of coefficients. $\frac{3}{4}$

$\frac{3x^2}{4x} \Rightarrow$ Top Heavy $\rightarrow$ infinity

$\frac{3x}{4x^2} \Rightarrow$ Bottom Heavy $\rightarrow \emptyset$

$$\frac{x^2-16}{x^2+2x-8}$$

Domain

Vertical Asymptote or Hole

$\frac{7}{0}$ ↑ undefined

Horizontal Asymptote

$x^2+2x-8 \neq 0$

$(x+4)(x-2) \neq 0$

$x+4 \neq 0$ $\quad$ $x-2 \neq 0$

$-4\ -4$ $\quad$ $+2\ +2$

$x \neq -4$ $\quad$ $x \neq 2$

Domain

$x \neq -4$ $\quad$ $x \neq 2$ — vertical asymptote

hole

$$x^2-16 = \frac{(x+4)(x-4)}{(x+4)(x-2)}$$

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