FINDING ASYMPTOTES

Graphs hug asymptotes.

$f(x) = \dfrac{1}{x}$

See how the graph is getting closer to the axes?... But, it will never touch them?

The **X** and **y** axes are asymptotes!

Asymptotes are lines (usually invisible) in space that a graph gets closer and closer to but never touches...

VERTICAL ASYMPTOTES

Set the denominator = 0 and solve.

HORIZONTAL ASYMPTOTES

Given some polynomial guy

$$f(x) = \dfrac{a\,x^n + \ldots}{b\,x^m + \ldots} \quad \longleftarrow \text{nth degree polynomial} \\ \longleftarrow \text{mth degree polynomial}$$

1 If $n < m$, then the x-axis is the horizontal asymptote.

2 If $n = m$, then the horizontal asymptote is the line $y = \dfrac{a}{b}$.

3 If $n > m$, then there is no horizontal asymptote. (There is a slant diagonal or oblique asymptote.)

$$f(x) = \frac{x+1}{x^2 + 6x + 8}$$

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

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

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

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

$$f(x) = \frac{2x + 1}{x^2 - 9}$$