

Graphs of Rational Functions

$$f(x) = \frac{x^3 + 6x^2 + 11x + 6}{x^2 - 1}$$

Domain

the allowable x -values

Vertical Asymptote

set the denominator equal to zero

Hole/Open Circle/Deleted Point

set the denominator that cancels equal to zero

Horizontal Asymptote

Degree of Numerator $>$ Degree of Denominator Horizontal Asymptote: None

Degree of Numerator $<$ Degree of Denominator Horizontal Asymptote: $y = 0$

Degree of Numerator $=$ Degree of Denominator Horizontal Asymptote: $y = \frac{\text{Leading Coefficient of Numerator}}{\text{Leading Coefficient of Denominator}}$

Slant/Oblique Asymptote

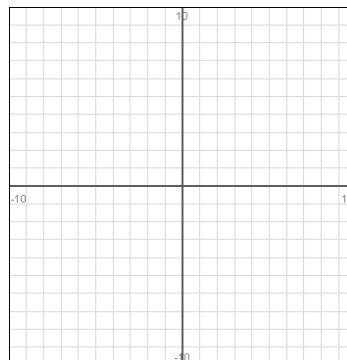
use long division only if there is no horizontal asymptote

x -intercepts

set y equal to zero and solve for x

y -intercept

set x equal to zero and solve for y

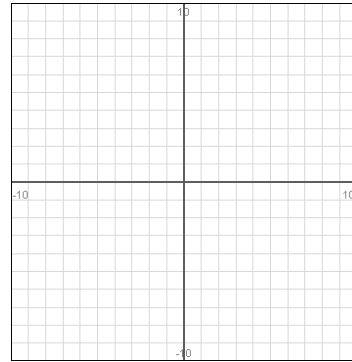


Steps to Graph Rational Functions

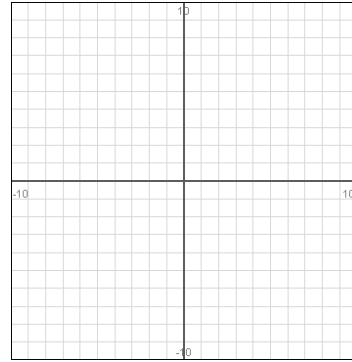
1. Find the Domain.
2. Find all asymptotes.
3. Find all intercepts.

1. Graph each rational function.

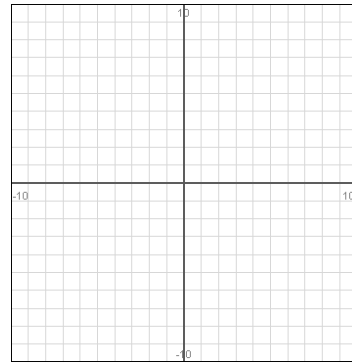
a) $f(x) = \frac{x^2 + 1}{x}$



b) $f(x) = \frac{x^2}{x^2 - 16}$



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



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

