Precalculus 115, section 3.7 Rational Functions

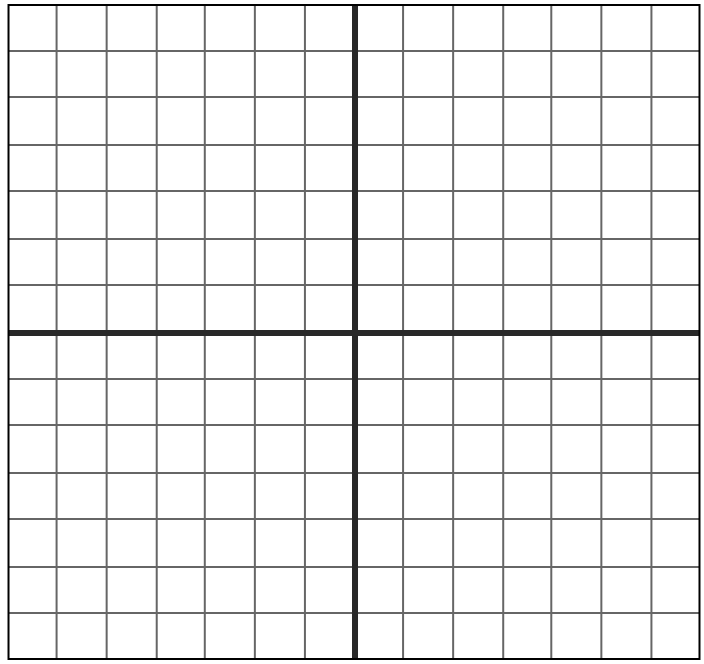
notes by Tim Pilachowski

Definition: A **rational function** is a function that can be expressed as a $\dfrac{\text{polynomial}}{\text{polynomial}}$ rational expression.

Where would the domain of a rational function be restricted?

When considering the graph of a rational function, we'll be looking for **asymptotes**, both vertical and horizontal.

Example A: Sketch the graph of $f(x) = \dfrac{x}{x-3}$.



domain:

vertical asymptote(s):

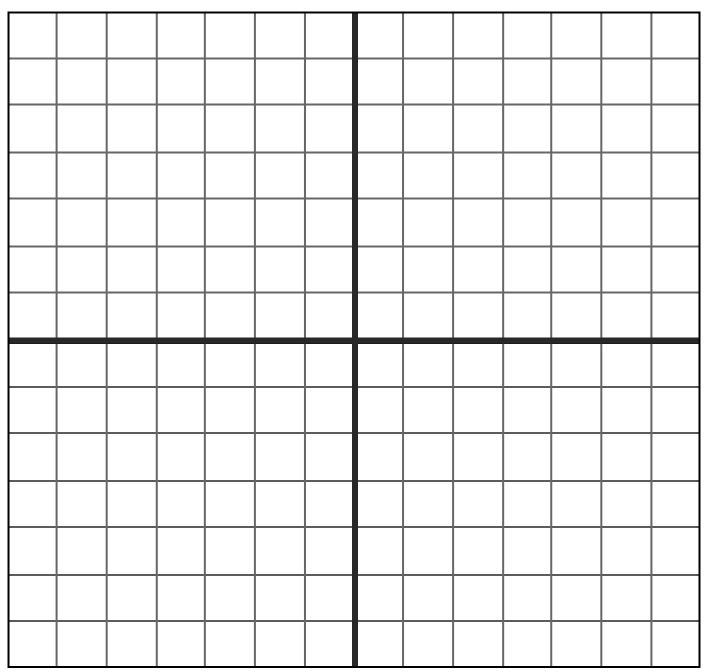
horizontal asymptote(s):

y-intercept:

x-intercepts:

For this class, we'll focus on getting a sketch of the graph, i.e. having the general shape. For quizzes and exams, you'll need to have the correct asymptotes (labeled with their equations), along with y-intercepts and x-intercepts (labeled with their coordinates), and correct placement above or below the x-axis and asymptotes.

Example B: Sketch the graph of $f(x) = \dfrac{2}{x^2 - 2x - 3}$.



domain:

vertical asymptote(s):

horizontal asymptote(s):

y-intercept:

x-intercepts:

Example C: Sketch the graph of $f(x) = \dfrac{-2x}{x^2 - 2x - 3}$.

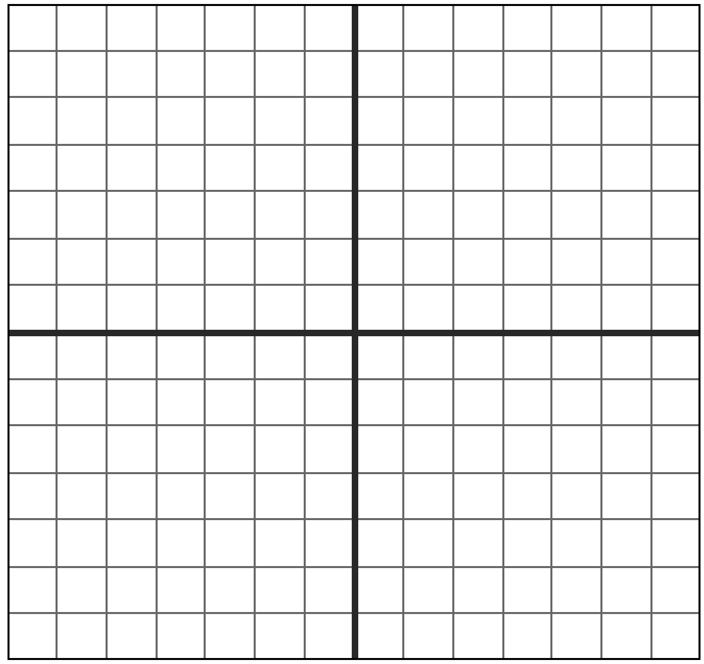
domain:

vertical asymptote(s):

horizontal asymptote(s):

y-intercept:

x-intercepts:



Example D: Sketch the graph of $f(x) = \dfrac{2x^2 - 8}{x^2 - 2x - 3}$.

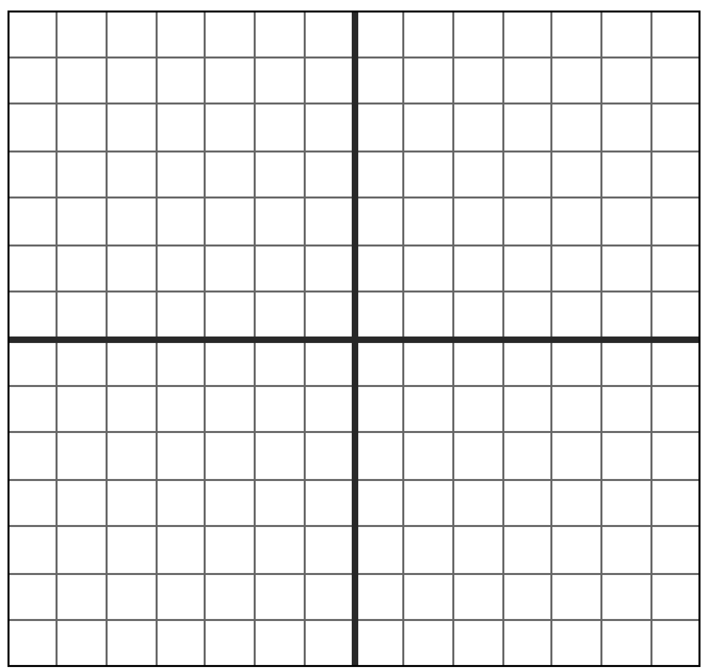
domain:

vertical asymptote(s):

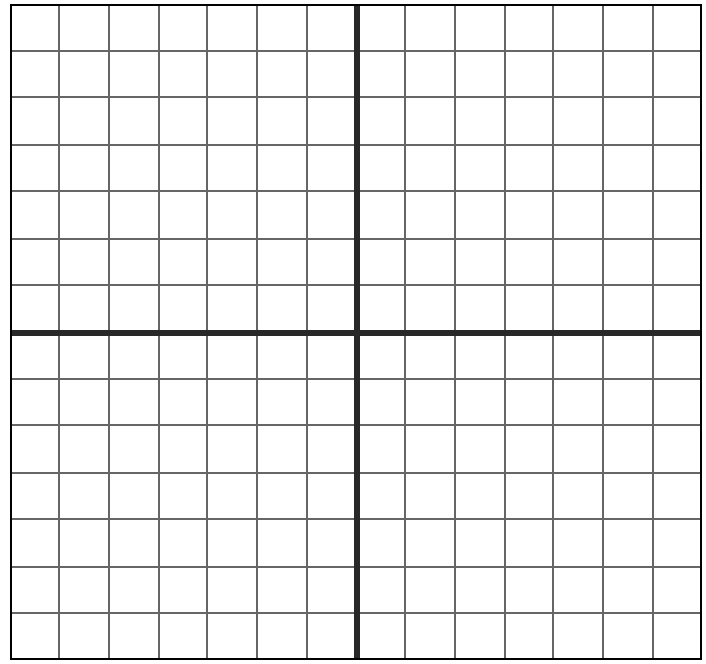
horizontal asymptote(s):

y-intercept:

x-intercepts:



Example E: Sketch the graph of $f(x) = \dfrac{x^4}{x^2 - 2x - 3}$.



domain:

vertical asymptote(s):

horizontal asymptote(s):

y-intercept:

x-intercepts:

For this class, you won't be asked to find the equations of any slant asymptotes, but the shape of your graph should indicate occasions when one is present.