Rational Functions: Graphing

Objectives

– Graph rational functions.

To Graph a Rational Function

1. Find vertical asymptotes. (Set denominator equal to zero)

2. Find horizontal asymptotes (compare degrees)
   - If deg. of P(x) < deg. of Q(x), horiz. asymptote y = 0
   - If deg. of P(x) = deg. of Q(x), horiz. asymptote \( y = \frac{\text{leading coeff. P}(x)}{\text{leading coeff. Q}(x)} \)
   - If deg. of P(x) > deg. of Q(x), no horiz. asymptote

3. Find the x-intercepts. (Set y = 0)

4. Find the y-intercept. (Set x = 0)

5. Find any necessary additional points to determine behavior between and near vertical asymptotes.

Example 1

Graph \( f(x) = \frac{x + 3}{2x^2 - 5x - 3} \)

Example continued
Example 2

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

- Vertical Asymptote $x = -2$
- Horizontal Asymptote $y = 1$
- $x$-intercept $(3, 0)$
- $y$-intercept $(0, -3/2)$