- ✓ <u>Rational functions</u>: Equations of the form $f(x) = \frac{P(x)}{Q(x)}$ where *P*(*x*) and *Q*(*x*) are both polynomials.
- ✓ <u>y intercept</u>: This is the point where the curve crosses the y axis. Set
 x = 0 and solve for y.
- ✓ <u>x intercept</u>: This is the point where the curve crosses the x axis. Set the numerator equal to zero and solve for x.
- Vertical Asymptotes: Find the values of x which make the denominator equal to zero.

Warning: The function must be in lowest terms! Why?

- ✓ Horizontal Asymptotes:
 - 1. If the degree of numerator is less than degree of denominator, the graph has a horizontal asymptote y = 0. Why?
 - 2. If the degree of numerator equals the degree of denominator then the horizontal asymptote is equal to the ratio of the leading coefficients.

Example:
$$y = \frac{5x^2 + 6x - 7}{3x^2}$$
 Horizontal asymptote $y = \frac{5}{3}$

✓ <u>Slant Asymptotes</u>:

1. If the degree of the numerator is one more than the degree of the denominator, perform the long division $P(x) \div Q(x)$. The quotient is the slant asymptote. (We ignore the remainder).

Warning: The rational function must be fully reduced **before** asymptote analysis takes place!

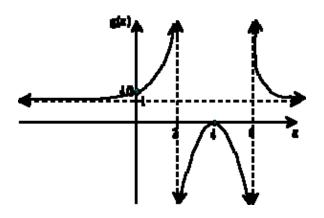
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Graph
$$g(x) = \frac{(x-4)^2}{(x-2)\cdot(x-6)}$$

- x intercepts (4, 0)
- y intercepts (0, 4/3)
- vertical asymptotes The lines x = 2 and x = 6 are the vertical asymptotes.
- horizontal asymptotes Degree of the numerator equals the degree of the denominator → The horizontal asymptote is the ratio of the leading coefficients.

The horizontal asymptote is y = 1 (from 1/1).

Graph other points as needed....



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