General Rational Graphs

$$f(x) = \frac{ax^m + \ldots}{bx^n + \ldots}$$

Ex. $\frac{3x^3 - 2x + 7}{4x^3 + 15}$

$m = 3 \quad n = 3$

$a = 3 \quad b = 4$

$m = n$

so $y = \frac{a}{b}$ is a H.A.

$y = \frac{3}{4}$ is H.A.

x-intercepts: Zeros of the numerator

Vertical Asymptotes: Zeros of the denominator

Horizontal Asymptotes:

if $m < n$ then $y = 0$ is a HA

if $m = n$ then $y = \frac{a}{b}$ is a HA

if $m > n$, then there is no HA

Plot several points on either side of each vertical asymptote.

Use your calculator

Ex. $y = \frac{3x^2}{x^2 - 1}$

X-int: zeros of the numerator.

numerator = 0

$3x^2 = 0$

$x^2 = 0$

$x = 0$

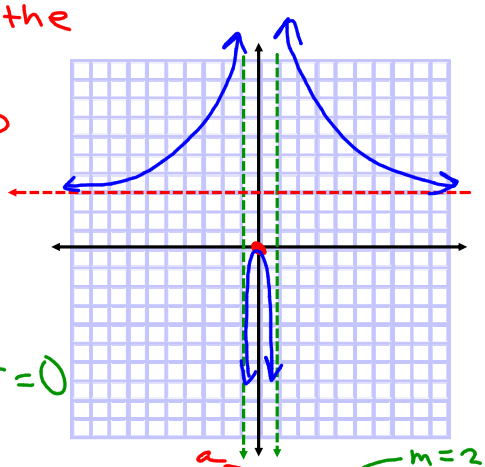
V.A. denominator = 0

$x^2 - 1 = 0$

$(x - 1)(x + 1) = 0$

$x - 1 = 0 \quad x + 1 = 0$

$x = 1 \quad x = -1$



H.A. $\frac{3x^2}{x^2 - 1}$ ($m = 2$, $n = 2$; a = 3, b = 1)

$m = n$, so $\frac{a}{b}$ is a H.A.

$\frac{3}{1} = 3$ H.A. $y = 3$

p568 / #13, 15, 16, 17, 18