

ANALYZING RATIONAL FUNCTIONS

(Including asymptotes, x-intercept, and y-intercepts)

VERTICAL ASYMPTOTE

- Set the denominator equal to "0" and solve. The **vertical asymptote is $x = \text{"solution"}$**

HORIZONTAL ASYMPTOTE

Look at the $\frac{\text{power on } x}{\text{power on } x}$ (referred to as power fraction in this handout)

- If the power fraction is a **proper fraction**-meaning the degree of the denominator is larger than the degree of the numerator, then the **horizontal asymptote is $y = 0$** .
- If the power fraction is **equal to 1**-meaning the degree of the denominator is the same as the degree of the numerator, then the horizontal asymptote is

$$Y = \frac{\text{leading coefficient of the numerator}}{\text{leading coefficient of the denominator}}$$

- If the power fraction is an **improper fraction**-meaning the degree of the numerator is larger than the degree of the denominator, then there will be **no** horizontal asymptote.

SLANT ASYMPTOTE

If the **degree of the numerator is exactly one more than the degree of the denominator**, then there is a slant asymptote.

To find the slant asymptote:

1. Multiply the numerator and the denominator out, if necessary.
2. Divide the numerator by the denominator.
3. Set the quotient equal to y and ignore the remainder.
4. The resulting equation is the slant asymptote.

X-INTERCEPT

An x-intercept is a result of when $y=0$, therefore, set **the numerator = "0"** and solve

Y-INTERCEPT

A y-intercept results when $x=0$, therefore the **y-intercept is** $\frac{\text{constant of the numerator}}{\text{constant of the denominator}}$

Sample problem: $y = \frac{3x-4}{x-2}$