So far we've seen Horizontal Asymptotes when the Numerator has a smaller or equal degree compared to the degree of the denominator.

We will now look at SLANT ASYMPTOTES

Slant asymptotes occur when the numerator has a degree that is one higher than the denominator.

Example: $f(x) = \dfrac{4x^3 + 8x^2 + 2x - 5}{2x^2 + 5x + 1}$ Use Long Division

$$
\begin{array}{r l}
 & \underline{2x \;\; - 1 \qquad\qquad} \\
2x^2 + 5x + 1 \;) & 4x^3 + 8x^2 + 2x - 5 \\
 & \underline{4x^3 + 10x^2 + 2x\quad} \\
 & \qquad -2x^2 \qquad\quad -5 \\
 & \qquad \underline{-2x^2 - 5x - 1} \\
 & \qquad\qquad\quad 5x - 4
\end{array}
$$

We will have the quotient: $2x - 1 + \dfrac{5x - 4}{2x^2 + 5x + 1}$

As x approaches $\pm\infty$, the remainder fraction gets closer and closer to zero and ultimately dissapears.

Therefore the **Slant Asymptote** is: $\boxed{y = 2x - 1}$

At this point in our study, when faced with a Rational Function, we will calculate the following:

1. x-intercept
2. y-intercept
3. Horizontal or Slant Asymptote
4. Vertical Asymptote
5. Holes
6. Draw Graph

Example: $f(x) = \dfrac{2x^2 - 5x + 5}{x - 2}$ The numerator cannot be factored

$$\begin{array}{r|rrr} 2 & 2 & -5 & 5 \\ & & 4 & -2 \\ \hline & 2 & -1 & 3 \end{array}$$

$(2x^2 - 5x + 5) \div (x - 2) = 2x - 1 + \dfrac{3}{x - 2}$

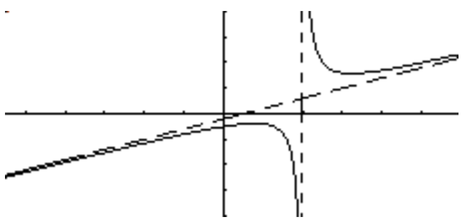
1. x-int: $\boxed{\text{None}}$

2. y-int: $\boxed{-\dfrac{5}{2}}$

3. Slant A: $\boxed{y = 2x - 1}$

4. VA: $\boxed{x = 2}$

5. Hole: $\boxed{\text{None}}$



Pre-Calculus 1 Assignment 125 Monday, October 26, 2015 Hour Name

For Each Exercise, On a Separate Sheet of Paper Find:

a. x-int

b. y-int

c. Slant Asymptotes

d. Vertical Asymptotes

e. Holes

Box each item. If the item does not exist write None.

f. Then Draw the Graph.

1. $f(x) = \frac{2x^2 + 1}{x}$

2. $g(x) = \frac{1 - x^2}{x}$

3. $h(x) = \frac{x^2}{x - 1}$

4. $g(x) = \frac{x^3}{2x^2 - 8}$

5. $f(x) = \frac{x^2 - 1}{x^2 + 4}$

6. $f(x) = \frac{x^3 + 2x^2 + 4}{2x^2 + 1}$