

Name _____

Date _____

Slant Asymptotes: If the degree on the top is one degree higher than the degree on the bottom, then the function has a slant asymptote, $y = mx + b$

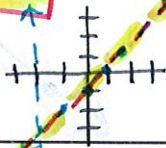
linear slope y-int

- Use Synthetic division to find the equation.

Ex 1. $f(x) = \frac{x^2 + x - 6}{x + 2}$ \leftarrow VA $x = -2$

$$\begin{array}{r|rrr} -2 & 1 & 1 & -6 \\ & \downarrow & -2 & 2 \\ \hline & 1 & -1 & \cancel{2} \end{array}$$

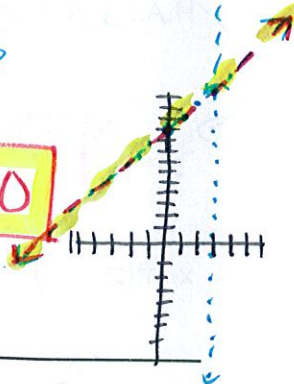
$y = x - 1$



Ex 2. $f(x) = \frac{x^2 + 7x + 12}{x - 3}$ \leftarrow VA $x = 3$

$$\begin{array}{r|rrr} 3 & 1 & 7 & 12 \\ & \downarrow & 3 & 30 \\ \hline & 1 & 10 & \cancel{42} \end{array}$$

$y = x + 10$



Ex 3. What if $f(x) = \frac{x^3 + x^2 - x + 5}{x^2 - 4}$?
 $(x - 2)(x + 2)$

*Synth. divide twice! *

$$\begin{array}{r|rrrr} 2 & 1 & 1 & -1 & 5 \\ & \downarrow & 2 & 6 & 10 \\ \hline -2 & 1 & 3 & 5 & \cancel{15} \\ & \downarrow & -2 & 2 & \\ \hline & 1 & 1 & \cancel{3} & \end{array}$$

$y = x + 1$

Increasing & Decreasing: X-values, read from left to right.

Dec: none **Only use parentheses!!**
 Inc: $(-\infty, 2)(2, \infty)$

* Stop @ VA's + X-value holes

1. $f(x) = \frac{x^2 + 2x - 15}{x + 2} = \frac{(x + 5)(x - 3)}{x + 2}$

$$\begin{array}{r|rrr} -2 & 1 & 2 & -15 \\ & \downarrow & -2 & 0 \\ \hline & 1 & 0 & \cancel{15} \end{array}$$

V.A.: $x = -2$

Hole: none

H.A.: none

Inc: $(-\infty, -2)(-2, \infty)$

S.A.: $y = x$

Dec: none

x-int(s): $(-5, 0)(3, 0)$

Domain: $(-\infty, -2)(-2, \infty)$

y-int: $(0, -7.5)$

Range: $(-\infty, \infty)$

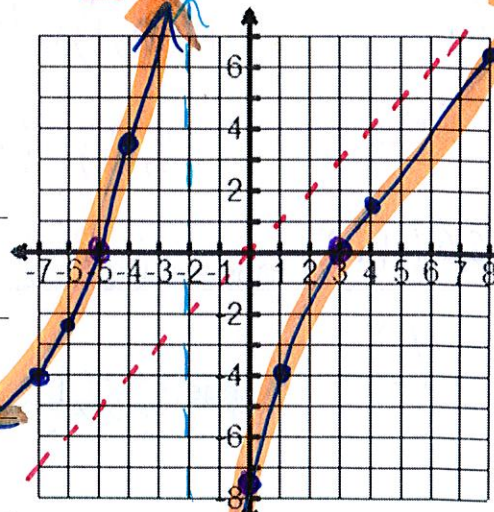


Table in calc.

x	y
-7	-4
-6	-2.25
-5	0
-4	3.5
-1	-4
4	1.5
8	6.5

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

$$\begin{array}{r} 2 \overline{) 1 \ -1 \ -6} \\ \underline{1 \ \ 1 \ \ 2} \\ \end{array}$$

V.A.: $x=2$

Hole: none

H.A.: none

Inc: $(-\infty, 2)(2, \infty)$

S.A.: $y=x+1$

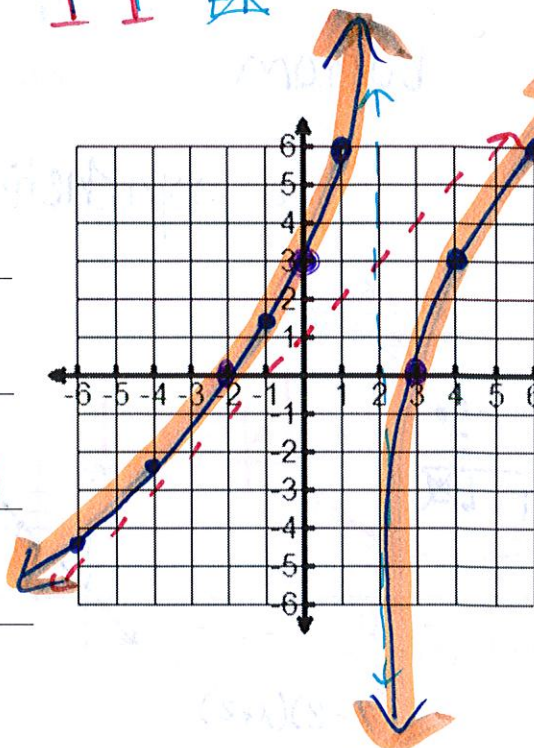
Dec: none

x-int(s): $(3, 0)(-2, 0)$

Domain: $(-\infty, 2)(2, \infty)$

y-int: $(0, 3)$

Range: $(-\infty, \infty)$



table

x	y
-6	-4.5
-4	-2.3
-2	0
-1	1.3
1	6
3	0
4	3
6	6

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

$$\begin{array}{r} 3 \overline{) 1 \ -1 \ -2} \\ \underline{1 \ \ 3 \ \ 6} \\ \end{array}$$

V.A.: $x=3$

Hole: none

H.A.: none

Inc: $(-\infty, 1) \cup (5, \infty)$

S.A.: $y=x+2$

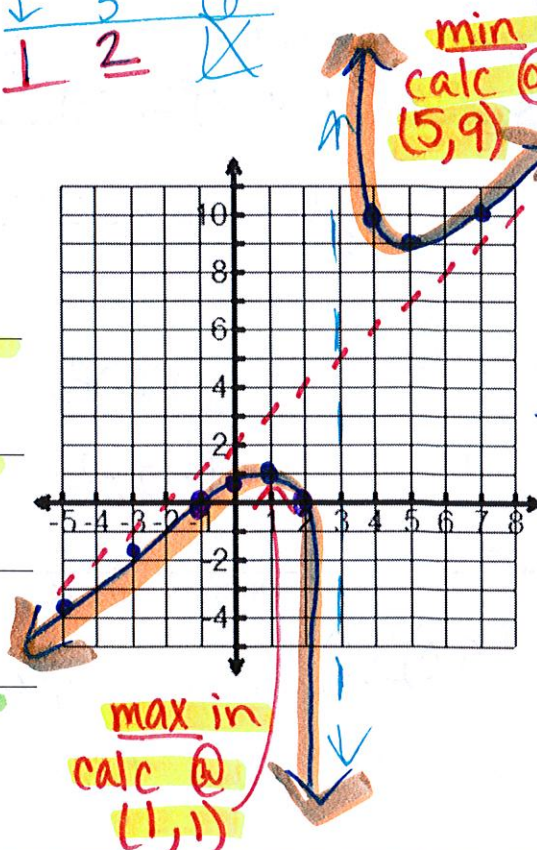
Dec: $(1, 3) \cup (3, 5)$

x-int(s): $(2, 0)(-1, 0)$

Domain: $(-\infty, 3)(3, \infty)$

y-int: $(0, 2/3)$

Range: $(-\infty, 1] \cup [9, \infty)$



min in calc @ (5, 9)

max in calc @ (1, 1)

x	y
-5	-3.5
-3	-1.7
0	.66
1	1
4	10
5	9
7	10