Questions from Homework

④ f) $y = \dfrac{2x^2}{x^2+3x-4} = \dfrac{2x^2}{(x+4)(x-1)}$

① Intercepts:

x int (y=0)

$2x^2=0$

$x^2=0$

$x=0$ (0,0)

y int (x=0)

$y=\dfrac{0}{-4}=0$

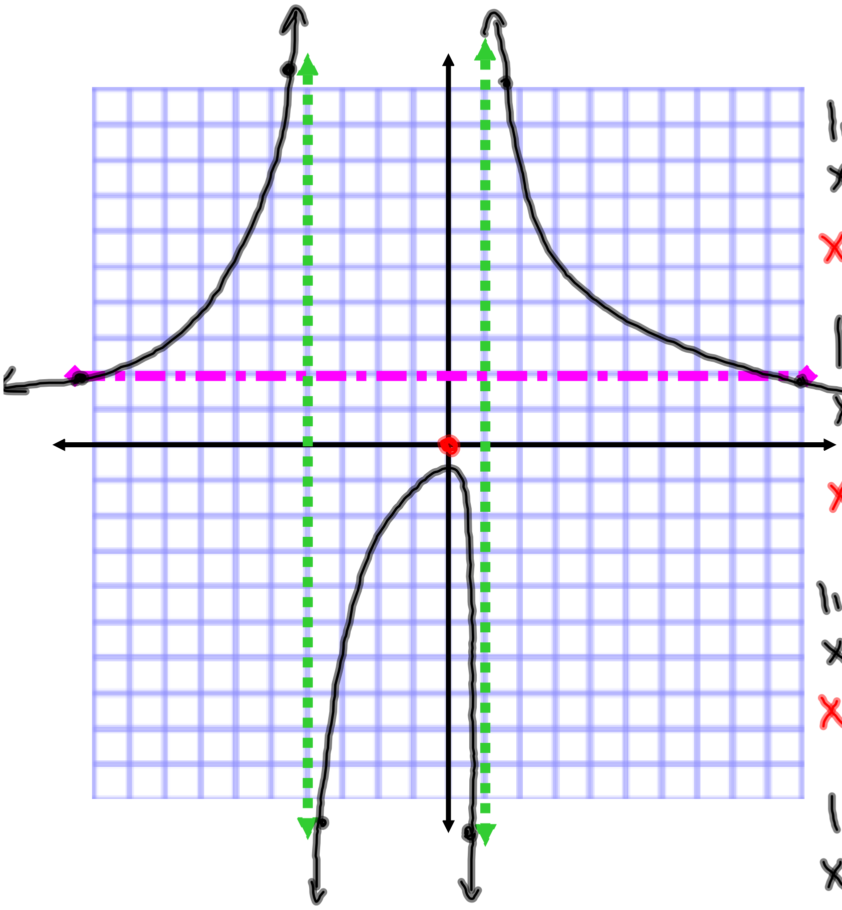
(0,0)

② Asymptotes:

HA: $y=2$

VA: $x+4=0$ | $x-1=0$

$x=-4$ | $x=1$



$\lim_{x\to -4^-} \dfrac{(+)}{(-)(-)} = +\infty$

x = -4.01

$\lim_{x\to -4^+} \dfrac{(+)}{(+)(-)} = -\infty$

x = -3.99

$\lim_{x\to 1^-} \dfrac{(+)}{(+)(-)} = -\infty$

x = 0.99

$\lim_{x\to 1^+} \dfrac{(+)}{(+)(+)} = +\infty$

x = 1.01

⑥ a) $y = (x+1)(x-2)(3-x) = -(x+1)(x-2)(x-3)$

x int.

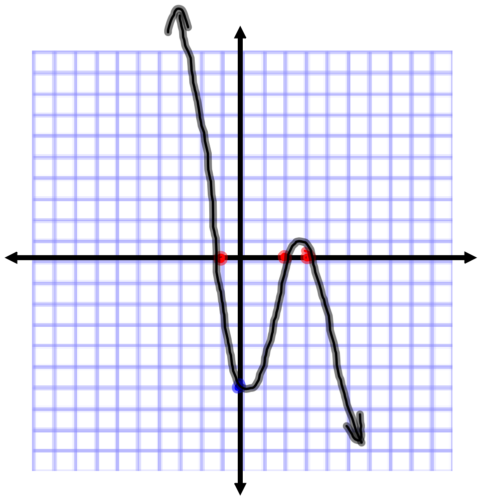
$x = -1, 2, 3$

y int

$y = (1)(-2)(3) = -6$

$$\lim_{x\to\infty} \overset{+}{(x+1)}\overset{+}{(x-2)}\overset{-}{(3-x)} = -\infty$$

$$\lim_{x\to-\infty} \overset{-}{(x+1)}\overset{-}{(x-2)}\overset{+}{(3-x)} = \infty$$



Curve Sketching

In this chapter we look at further aspects of curves such as vertical and horizontal asymptotes, concavity, and inflections points. Then we use them, together with intervals of increase and decrease and maximum and minimum values, to develop a procedure for curve sketching.

Slant Asymptotes

"oblique"

For rational functions, slant asymptotes occur when the degree of the numerator is one more than the degree of the denominator and can be found by division.

Example

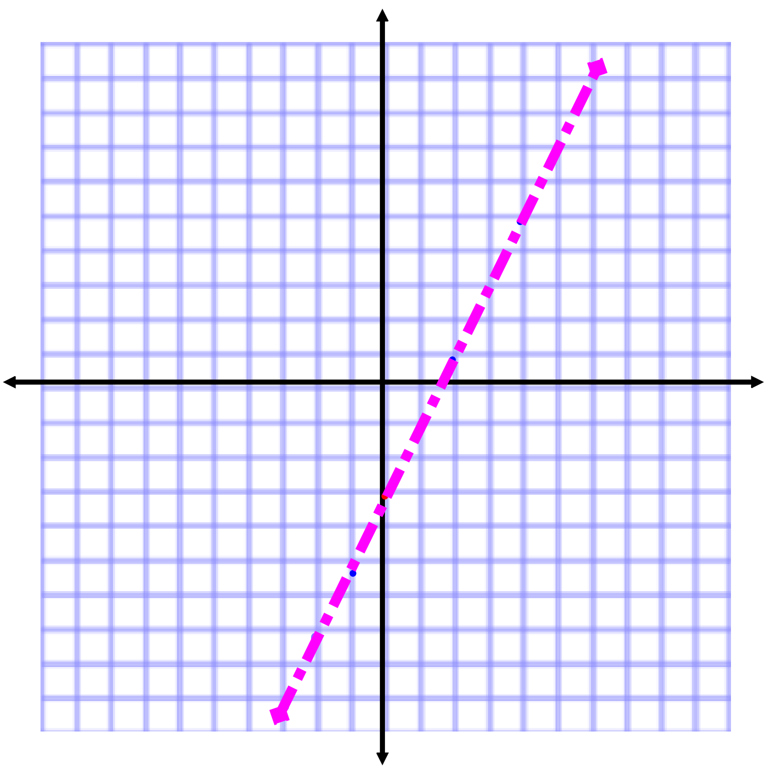
Find the slant asymptote of the curve $$y = \frac{2x^3 - 3x^2 + x - 3}{x^2 + 1}$$

$$\begin{array}{r l}
 & 2x-3 \\
x^2+1 & \overline{)\,2x^3-3x^2+x-3} \\
 & -(2x^3 \qquad +2x) \\
 & \qquad -3x^2-x-3 \\
 & \qquad -(-3x^2 \qquad -3) \\
 & \qquad\qquad -x
\end{array}$$

Oblique Asymptote:

$y = 2x - 3$

If you wanted to put on your graph use slope and point or table of values.



OA: $y = 2x - 3$

$m = \frac{2}{1}$ $\quad b = -3$

Example

Find the slant asymptote of the curve $$y = \frac{1 + x - x^2}{x - 1}$$

$$\begin{array}{r} -x \\ x-1 \overline{\big) -x^2 + x + 1} \\ -(-x^2 + x) \\ \hline 1 \end{array}$$

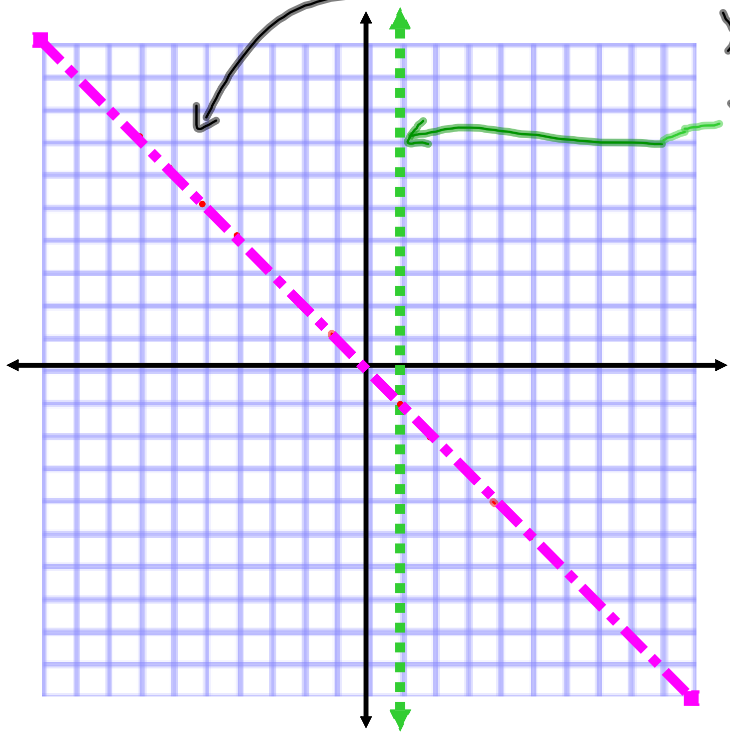
Oblique Asymptote:

$y = -x$ $\quad m = \frac{-1}{1}$ $\quad b = 0$

Vertical Asymptote:

$x - 1 = 0$

$x = 1$



Homework