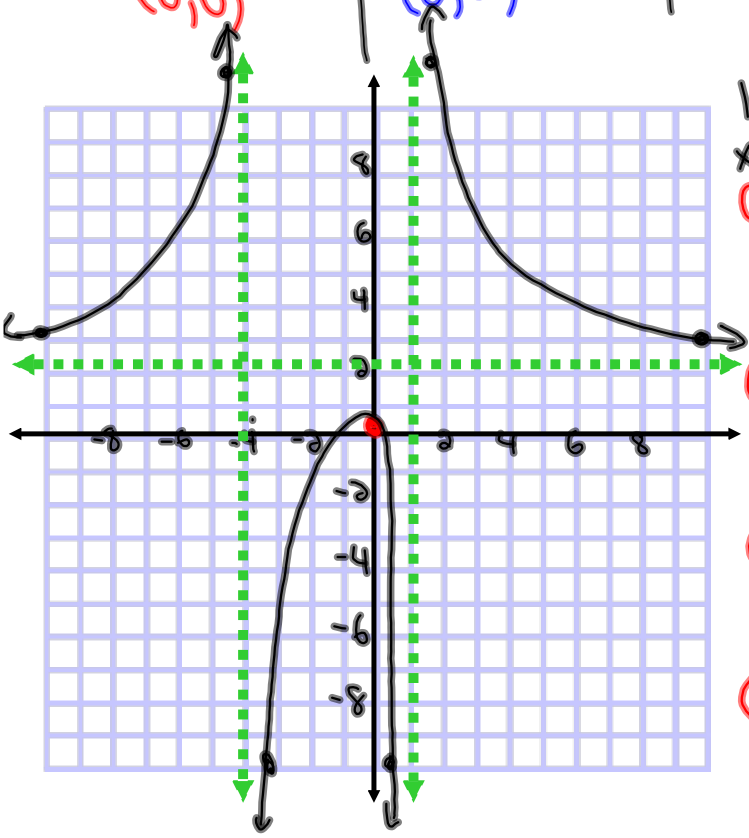
Questions from Homework

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

① x-int (y=0)	② y-int (x=0)	③ VA	④ HA:
$2x^2=0$	$y=\dfrac{2(0)^2}{(0)^2+3(0)-4}$	$x-1=0$ | $x+4=0$	$\lim\limits_{x\to\infty} \dfrac{2x^2}{x^2+3x-4} = 2$
$x^2=0$	$y=\dfrac{0}{-4}=0$	$x=1$ | $x=-4$	$y=2$
$x=0$			
(0,0)	(0,0)		



$\lim\limits_{x\to -4^-} \dfrac{(+)}{(-)(-)} = +\infty$ (x=-4.01)

$\lim\limits_{x\to -4^+} \dfrac{(+)}{(-)(+)} = -\infty$ (x=-3.99)

$\lim\limits_{x\to 1^-} \dfrac{(+)}{(-)(+)} = -\infty$ (x=0.99)

$\lim\limits_{x\to 1^+} \dfrac{(+)}{(+)(+)} = +\infty$ (x=1.01)

⑰ i) $f(x)=\frac{2x^3-18x}{x^3-x^2-2x}=\frac{2x(x^2-9)}{x(x^2-x-2)}=\frac{\cancel{2x}(x-3)(x+3)}{\cancel{x}(x-2)(x+1)}=\frac{2(x-3)(x+3)}{(x-2)(x+1)}$

① x-int $(y=0)$ (zeros of num.)

$2(x-3)(x+3)=0$

$(x-3)(x+3)=0$

$x-3=0$ | $x+3=0$

$x=3$ | $x=-3$

$(3,0)$ | $(-3,0)$

② y-int $(x=0)$

$y=\frac{2(0)^3-18(0)}{(0)^3-(0)^2-2(0)}$

$y=\frac{0}{0}$???

No y-int

③ VA: (zeros of denom)

$(x-2)(x+1)=0$

$x-2=0$ | $x+1=0$

$x=2$ | $x=-1$

④ HA

$\lim_{x\to\infty}\frac{2x^3-18x}{x^3-x^2-2x}=2$

$y=2$

⑤ Point of discontinuity (Hole) @ $x=0$

because x is a factor of both the numerator and denominator

To find height of hole use the simplified function

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

$f(0)=\frac{2(0-3)(0+3)}{(0-2)(0+1)}=\frac{2(-3)(3)}{(-2)(1)}=\frac{-18}{-2}=9$

Hole @ $(0,9)$

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

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 $y = \dfrac{2x^3 - 3x^2 + x - 3}{x^2 + 1}$

Example

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

Homework