Worksheet 10 RATIONAL FRACTIONAL FUNCTION

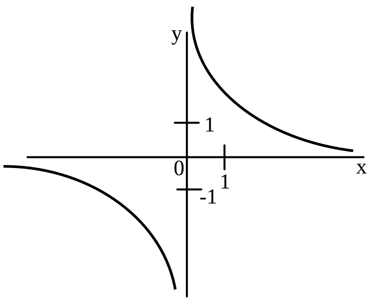
$y = \frac{P(x)}{Q(x)} = \frac{ax+b}{cx+d} = \frac{k}{x}; (k \neq 0)$

P(x) and Q(x) are polynomials and $Q(x) \neq 0$

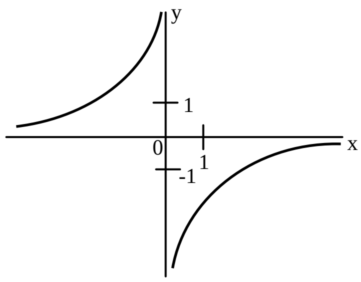
$a, b, c, d \in R; c, d \neq 0$ and $ad \neq bc$;(if $ad \neq bc$ then it is constant function)

- The graph of this function is **hyperbola**

k > 0



k < 0



Domain = R- {0}
Range = R- {0}

Decreasing on the intervals $(-\infty, 0), (0, \infty)$

Increasing on the intervals $(-\infty, 0), (0, \infty)$

Not bounded above neither below
No maximum, no minimum
Odd

EXAMPLE: Draw the graph of the function $y == \frac{3-x}{x-1}$ y = and write all the properties.

- **Divide (3-*x)* by (*x* – 1)**
  1. For the moment, I'll ignore the other terms and look just at the leading *x* of the divisor and the leading -x of the dividend.
     -*x*+3:(*x* - 1) = -1
  2. Now I'll take that *x*, and multiply it through the divisor, *x* - 1.

     – *x*+3 :(*x* - 1) = -1

     - *x* +1

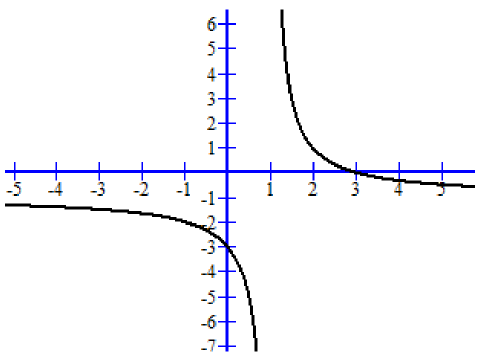
  3. To subtract the polynomials, I *change all the signs* in the second line

–*x* + 3 :(*x* - 1) = -1

x - 1

2

So I can write $y == \frac{3-x}{x-1} = -1 + \frac{2}{x-1}$



D(f) = R - {1}; H(f) = R - {-1}, decreasing, not even, not odd, one-to-one,not bounded, no Min, no Max

EXERCISES:Draw graphs of the following functions and write properties

a) $y = \frac{2x+3}{x-1}$,

b) $y = \frac{-x+2}{x-1}$,

c) $y = \frac{2x-4}{-x+2}$

d) $y = \frac{x+3}{x-1}$,

e)* $y = \frac{5-2x}{3x-1}$

f)* $y = \frac{3x+3}{2x-4}$

Division of polynomials

$(4x^3 + 5x^2 - 3x + 8) : (2x + 3) = 2x^2 - 0.5x - 0.75 + \frac{8.25}{2x+3}$

$\underline{-(4x^3 + 6x^2)}$

$(- x^2 - 3x + 8)$

$\underline{-(- x^2 - 1.5x)}$

$(- 1.5x + 8)$

$\underline{-(-1.5x - 2.25)}$

8.25