WARMUP in notes

What values make each denominator = 0?

1) $\frac{5}{3x-4}$

$3x-4=0$

$3x=4$

$x=\frac{4}{3}$

2) $\frac{7x}{x^2-9x-10}$

$x^2-9x-10=0$

$(x-10)(x+1)=0$

-10, 1, -10, -9

$x-10=0$ $\quad x+1=0$

$x=10$ $\quad x=-1$

3) $\frac{5x+2}{x^2-64}$

$x^2-64=0$

$(x+8)(x-8)=0$

$x+8=0$ $\quad x-8=0$

$x=-8$ $\quad x=8$

Section 3.4 Rational Functions

A rational function can be written as a fraction of polynomials. $p(x)=\frac{f(x)}{g(x)}$ where f and g are polynomials. To find the domain, set denominator = 0. The domain is all real numbers except what made the denominator = 0.

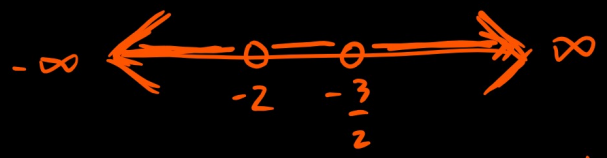
Many rational functions have <u>vertical asymptotes</u> which are vertical lines that the graph does not cross. To find V.A.s, reduce $\frac{f(x)}{g(x)}$ to lowest terms and set the new denominator = 0.

<u>ex</u>: Find domain and V.A.s of $f(x) = \frac{x^2-16}{2x^2+7x+6} = \frac{(x+4)(x-4)}{(2x+3)(x+2)}$

Domain: $(2x+3)(x+2) = 0$

$2x+3 = 0$ $\quad$ $x+2 = 0$

$x = -\frac{3}{2}$ $\quad$ $x = -2$

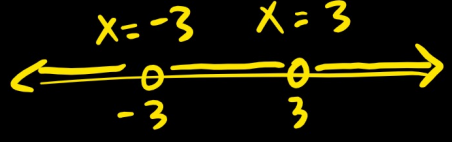


$D = (-\infty, -2) \cup (-2, -\frac{3}{2}) \cup (-\frac{3}{2}, \infty)$

V.A.s $\quad x = -2, \; x = -\frac{3}{2}$

<u>ex</u>: Find domain and V.A.s for $f(x) = \frac{x+3}{x^2-9} = \frac{x+3}{(x+3)(x-3)}$

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



$D = (-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

V.A.s $\frac{\cancel{x+3}}{\cancel{(x+3)}(x-3)} = \frac{1}{x-3}$

V.A. $x = 3$

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Find domain (in interval notation), and V.A.s for:

1) $R(x) = \frac{4x}{x-3}$

3) $H(x) = \frac{-4x^2}{(x-2)(x+4)}$

5) $F(x) = \frac{3x(x-1)}{2x^2-5x-3}$

7) $R(x) = \frac{x}{x^3-8}$

9) $H(x) = \frac{3x^2+x}{x^2+4}$

11) $R(x) = \frac{3(x^2-x-6)}{4(x^2-9)}$

3) $(x-2)(x+4) = 0$

$x = 2, x = -4$

V.As: $x = 2, x = -4$

$D: (-\infty, -4) \cup (-4, 2) \cup (2, \infty)$