Calc AB

Lesson 28

9/1/15

Agenda: 9/1/15

HW Leader:

Period 3: Abby C.

Period 4: Leila W.

Lesson 28

Rational Functions

Special Limits

* Quiz 3 on Friday

Q: What is a rational function?

$$P(x) = \frac{a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0}{b_m x^m + b_{m-1} x^{m-1} + \cdots + b_1 x + b_0}$$

We will discuss those of the form:

$$P(x) = \frac{K_1 (x-r_1)(x-r_2)\cdots(x-r_n)}{K_2 (x-q_1)(x-q_2)\cdots(x-q_m)}$$

* Zeros of the numerator (and not the denominator) are zeros of the function
* Zeros of the denominator (and not the numerator) are the x-values of the vertical Asymptotes.
* Zeros of both are holes or asymptotes (depending on the multiplicity)

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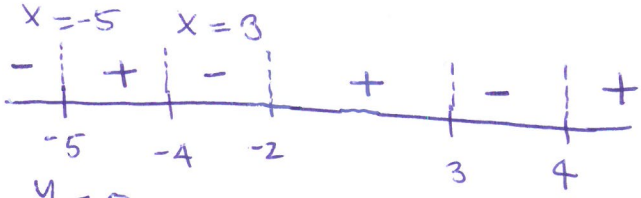
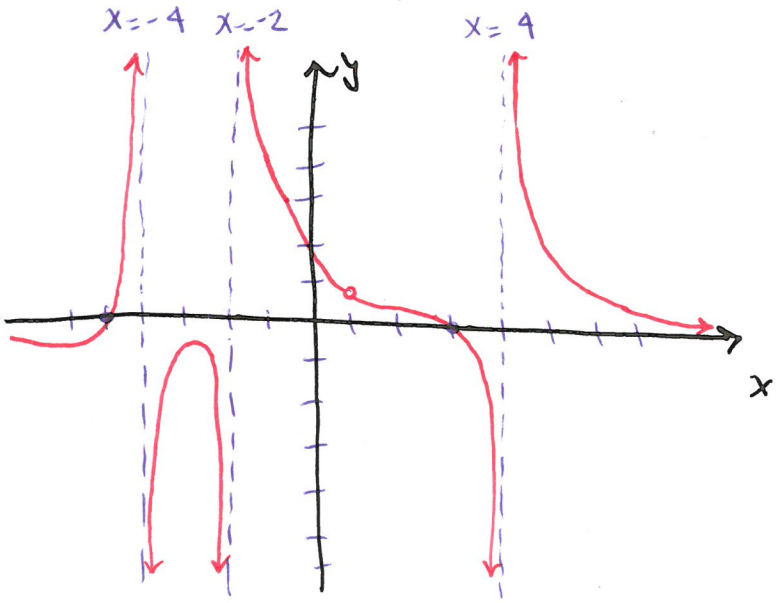
Ex. 28.2 Graph by hand $P(x) = \dfrac{(x+5)(x-3)(x-1)}{(x-4)(x+2)(x+4)(x-1)}$

1. Identify holes and asymptotes : hole $(1, \frac{4}{15})$ $x=4$, $x=-2$, $x=-4$
2. Identify zeros
3. Sign chart for zeros, Asymptotes :



4. Horizontal Asymptote : $y = 0$

Same as $\lim_{x\to\infty} P(x)$ and $\lim_{x\to-\infty} P(x)$



Special Limits (i.e. recognizing the definition of the derivative)

Ex. Evaluate $\lim_{h\to 0} \dfrac{\sin(\frac{\pi}{2}+h) - \sin(\frac{\pi}{2})}{h} = \dfrac{d}{dx}(\sin(x))\Big|_{\pi/2}$

$\dfrac{d}{dx}(\sin(x)) = \cos(x) \Rightarrow \dfrac{d}{dx}(\sin(x))\Big|_{\pi/2} = \cos(\pi/2) = 0$

Thus $\lim_{h\to 0} \dfrac{\sin(\frac{\pi}{2}+h) - \sin(\pi/2)}{h} = \boxed{0}$