Monday - Week 5

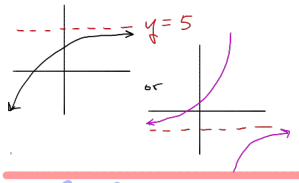
Exam 1: returned this week

Exam 2:

- Asymptotes / Long Division (Week 5)
- Log / Exp. Equations / properties (weeks 6-7)

Asymptotes: (an equation of a line that the graph of some function approaches)

Horizontal:



Recall: Rational fcn = ratio of polys

eg. $\frac{5x^2 + 3x + 1}{x^2 + 95x + 17}$

Ratios of Leading Terms if they are same degree $\Rightarrow$ you'll have a H.A.

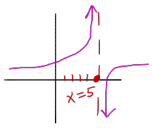
$\frac{5x^2}{x^2} = 5$ $\Rightarrow$ $y = 5$

$\Leftarrow$ In Ratio of Leading Terms

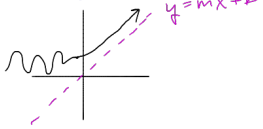
degree of den > deg of num

$\Rightarrow$ Horiz. Asy @ $y = 0$

Vertical: Where denom. $= 0$ (and numerator $\neq 0$)



Slant:



Degree of Numerator is 1 more than degree of the denom.

Ex $\frac{2x^2 + 3x + 1}{x + 1} = 2x + 1$ $(y, x \neq -1)$

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

the slant asy. $y = 2x + 1$

None degree of num > degree of denom + 1

Ex $\frac{3x^3 + x}{x + 1} = 3x^2 - 3x + 4 - \frac{4}{x+1}$

$$\begin{array}{r} 3x^2 - 3x + 4 \\ x+1 \overline{)\,3x^3 + 0x^2 + x} \\ -\underline{(3x^3 + 3x^2)} \\ -3x^2 + x \\ -\underline{(-3x^2 - 3x)} \\ 4x \\ -\underline{(4x + 4)} \\ -4 \end{array}$$

← remainder

Ex. $\frac{2x^2 + 3x + 2}{x + 1} = 2x + 1 + \frac{1}{x+1}$

quotient; remainder; divisor

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

So ...

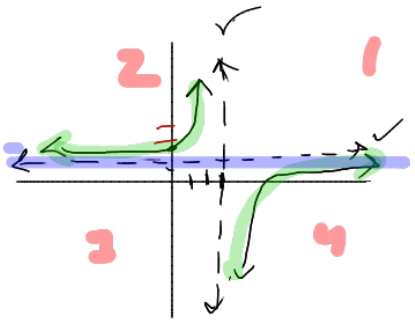
$\frac{5}{2} = 2 + \frac{1}{2}$

$$\begin{array}{r} 2 \\ 2 \overline{)\,5} \\ -4 \\ 1 \end{array}$$

Find all asymptotes & sketch graph.

Ex $f(x) = \dfrac{x^2-7x+12}{x^2-6x+9} = \dfrac{(x-3)(x-4)}{(x-3)^2}$

$\dfrac{x-4}{x-3}$



ratio of leading terms $\dfrac{x^2}{x^2} = 1$

Test

$x = 0 \Rightarrow \frac{12}{4}$ 1, 3

$x = 4 \Rightarrow$