

Section 4.5: cont'd

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9:27 AM

note: horizontal asymptotes only deal with "end behaviour" of x

(when x is very large and positive
 x very negative)

\therefore horizontal asymptotes have nothing to say about the middle of the graph

\Rightarrow you can cross horizontal asymptotes

oblique / slant asymptotes:

$$f(x) = \frac{P(x)}{Q(x)}$$

degree of $P(x) >$ degree of $Q(x)$

we will only look at the case
deg $P(x) =$ degree of $Q(x) + 1$

example: does $g(x) = \frac{2x^2 + 3}{x+1}$ have an oblique asymptote?

yes, deg of num $>$ deg of denom

where?

$$\begin{array}{r} 2x \quad -2 \\ x+1 \overline{) 2x^2 + 0x + 3} \\ \underline{2x^2 + 2x} \\ -2x + 3 \\ \underline{-2x - 2} \\ + 5 \end{array}$$

$$\frac{5}{x+1}$$

$$g(x) = \text{quotient} + \frac{\text{remainder}}{\text{divisor}}$$

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

as x gets large, this term gets really small

\therefore do long division

equation of asymptote is

$$y = \text{quotient}$$

and don't worry about the remainder

so for this example,

asymptote is at

$$y = 2x - 2$$