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Oblique Asymptotes

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*Degree on top is greater than the degree of the bottom by exactly 1.

Ex 1:

$f(x) = \frac{3x^2-2x+1}{x}$ } Let's think divison

Long Divison

Quotient

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

Divisor

Dividend

1 remainder

Divison Statement

$3x^2-2x+1 = (x)(3x-2)+1$

$\div (x)$

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

Rational Function

equivalent to my rational function

as x gets larger and larger, $\frac{1}{x}$ gets smaller and smaller

as $x \to \infty, \frac{1}{x} \to 0$

Conclusion:

Our function approaches $(3x-2)$ as x approaches infinity

$\therefore$ as $x \to \infty$, $f(x) \to 3x-2$

$\therefore$ Equation of Oblique Asymptote is $\boxed{y = 3x-2}$ ← the quotient

Ex 2:

$f(x) = \frac{6x^2+x}{2x+1}$

Long Division

$$\begin{array}{r} 3x-1 \\ 2x+1 \overline{)\,6x^2+x+0} \\ 6x^2+3x \\ \hline -2x+0 \end{array}$$

To find the oblique asymptote, we need to find the QUOTIENT

$\therefore$ Equation of Oblique Asymptote is $\boxed{y = 3x-1}$

Ex 3:

$f(x) = \frac{2x^3+3x^2+5x+8}{x^2+2}$

$$\begin{array}{r} 2x+3 \\ x^2+0x+2 \overline{)\,2x^3+3x^2+5x+8} \\ 2x^3+0x+4x \\ \hline 3x^2+4x+8 \\ -\,3x^2+0x+6 \\ \hline 1x+2 \end{array}$$

$\therefore$ Equation of oblique Asymptote is $\boxed{y = 2x+3}$