November 13, 2015

$f(x) = \boxed{(x-c)}(x-d)$

$f(c) = 0$

$x - c = 0$

$x = c$

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Rational Functions

$f(x) = \dfrac{N(x)}{D(x)}$

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

Asymptotes of f

1.) f has vertical asymptotes at the zeros of $D(x)$.

2.) f has at most one horizontal asymptote determined by comparing the degree of $N(x)$ and $D(x)$.

a.) If $n < m$, the line $y = 0$ (x axis) is a horizontal asymptote.

b.) If $n = m$, the line $y = \dfrac{a_n}{b_m}$ is the asymptote

c.) If $n > m$, f has no horizontal asymptote!

3.) If the degree of $N(x)$ is exactly one more than $D(x)$, then f has a "slant" asymptote.

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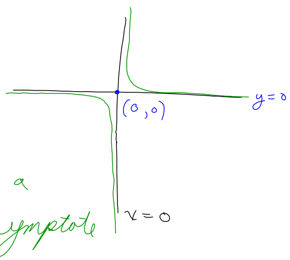
$x^0 = 1$

$f(x) = \dfrac{1x^0}{x}$

$x \neq 0$

So, $x = 0$ is a Vertical Asymptote



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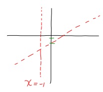
$f(x) = \dfrac{x^2 - x + 0}{x + 1}$ Degree: 2

Degree: 1

Domain: $x \neq -1$



V.A.: $x = -1$

H.A.: none

S.A.: $y = x - 2$

Finding slant asymptote

* By Synthetic Division

$$\begin{array}{r|rrr} -1 & 1 & -1 & 0 \\ & & -1 & 2 \\ \hline & 1 & -2 & 2 \end{array}$$

$2 \leftarrow R(x)$

$x - 2$

ans.: $\boxed{x - 2} + \dfrac{2}{x+1}$

slant asymptote is $Q(x)$

$y = x - 2$

$y = \boxed{1}x \boxed{-2}$

m

$b = y\text{-int}$

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