C12 - 9.6 - Slant Asymptote Notes

$$y = \frac{x^2}{x+1}$$

VA: $\quad x + 1 = 0$
$\quad\quad\quad x = -1$

HA: $\quad \dfrac{x^2}{x} \quad$ *none*

Slant Asymptote

$$\require{enclose}\begin{array}{r} x - 1 \\ x+1 \enclose{longdiv}{x^2 + 0 + 0} \\ \underline{x^2 + x} \\ -x + 0 \\ \underline{-x - 1} \\ +1 \end{array}$$

$x + 1 = 0$
$\quad\quad x = -1$

x^2

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

Slant Asymptote

$$y = x - 1$$

$x - 1 \quad R: +1$

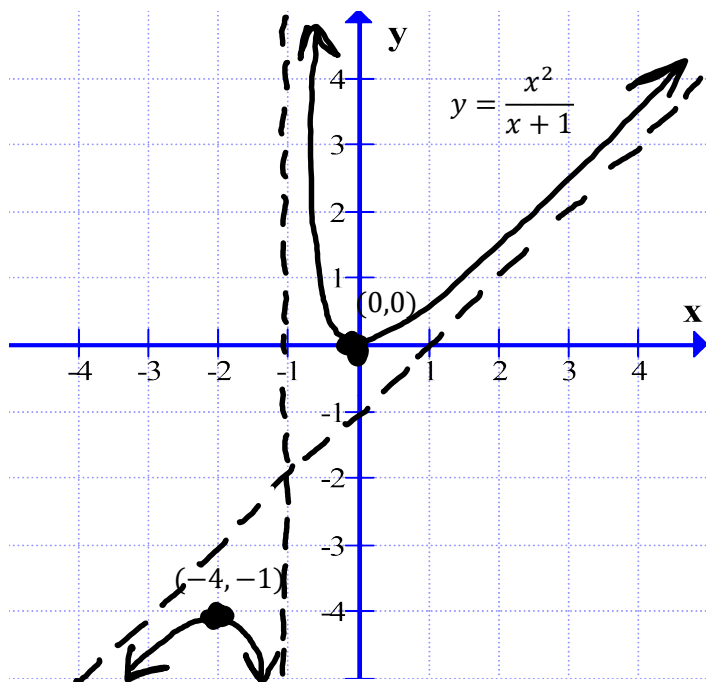$$\boxed{\dfrac{x^2}{x+1} = x - 1 + \dfrac{1}{x+1}}$$

$$x - 1 + \dfrac{1}{x+1}$$

$$x - 1 + \dfrac{1}{x+1}$$

$$\frac{P(x)}{x-a} = Q(x) + \frac{R}{x-a} \qquad\qquad Slant + \frac{R}{Divisor}$$

Slant Asymptote

$$y = \frac{x^2}{x+1}$$

$$y = x - 1$$

$(0,0)$

$(-4,-1)$

VA: $\quad x = -1$

x	y
-4	-1
-1	und
0	0

$$\boxed{\begin{array}{c} \dfrac{x^2}{x+1} = x - 1 + \dfrac{1}{x+1} \\[4mm] x - 1 \times \dfrac{x+1}{x+1} + \dfrac{1}{x+1} \\[2mm] \dfrac{x^2 - 1 + 1}{x+1} \\[2mm] \dfrac{x^2}{x+1} \end{array}}$$