$$\frac{x^2}{x+1} = x+1\overline{)\,x^2+0x}$$

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

$$\boxed{x-1+\frac{1}{x+1}}$$

$$\boxed{y = x-1} \leftarrow \text{oblique asymptote}$$

① Use long division to get oblique asymptote.

② Verify Oblique Asymptote

$\lim_{x\to\infty}[f(x)-(mx+b)] = 0$ ← see if this equals 0

got this from y above

$$\lim_{x\to\infty}\left[\frac{x^2}{x+1}-(x-1)\right]$$

Factor

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

$$\frac{x^2}{x+1}-\frac{x+1}{1}\left(\frac{x+1}{x+1}\right)$$

$$\frac{x^2}{x+1}-\frac{x^2+1}{x+1}$$

$$\frac{x^2-x^2+1}{x+1}$$

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

$$\lim_{x\to\infty}\frac{1}{x+1}$$

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

$$\frac{\frac{1}{x}(1)}{\frac{1}{x}(x)+\frac{1}{x}(1)}$$

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

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

$$\lim_{x\to\infty}\frac{\frac{1}{x}}{1+\frac{1}{x}}$$

$$\frac{\lim_{x\to\infty}\frac{1}{x}}{\lim_{x\to\infty}1+\lim_{x\to\infty}\frac{1}{x}} = \frac{0}{1+0} = 0$$

DONE

$$\lim_{x\to\infty}\frac{x^2}{x+1}-(x-1) = \lim_{x\to\infty}\frac{1}{x+1} = 0$$