3A.9. Oblique Asymptotes

Fact: In $R(x)=\frac{P(x)}{Q(x)}$, if the degree of $P(x)$ is one more than the degree of $Q(x)$, then $y=R(x)$ will have an oblique asymptote (O.A.).

Example. For $y=R(x)=\frac{0.5x^2+x-8}{x-4}$,

(a) Calculate the O.A.
(b) Find the V.A.
(c) Graph $y=R(x)$ with the window: $-4\le x\le 12$, $-6\le y\le 12$. Include the O.A. and V.A. on the graph.

Solution:

(a)
$$\begin{array}{c|ccc|c} 4 & 0.5 & 1 & & -8 \\ & & 2 & & 12 \\ \hline & 0.5 & 3 & & 4 \end{array}$$

$\rightarrow Y=R(x)=\frac{1}{2}x+3+\frac{4}{x-4}$ (goes to zero for large x)

$\Rightarrow y=\frac{1}{2}x+3$ is O.A. ($y=R(x)$ looks like the O.A. for large x).

(b) denominator is zero at $x=4$

(c)