



Two-way functions

Each column and row heading in the following table is a property that a function may or may not have. A function can appear in a cell if it has the properties in the corresponding row and column.

We have omitted some headings, and some entries in cells. Can you complete the table?

You might find it helpful to draw some sketches. You could use graph-sketching software such as [Desmos](#) to help you, but try to do the sketching by hand first, before reaching for a computer or calculator!

Make sure that you can explain why each function has the desired properties.

	y-axis is an asymptote			passes through origin
x = 1 is a root		$y = x - 1 $	$y = -3x + 3$	
has exactly two roots		$y = x(x - 2)$		
	$y = \frac{1}{x}$ for $x \neq 0$	$y = \frac{1}{(x - 1)^2}$ for $x \neq 1$	$y = \frac{3}{x + 1}$ for $x \neq -1$	
$y \rightarrow \infty$ as $x \rightarrow \infty$			$y = 2 + (x - 1)^4$	

- Can you complete the table using a different function in every cell?
- How few different functions can you use in the table?
- Did you have any choice about the column and row headings?