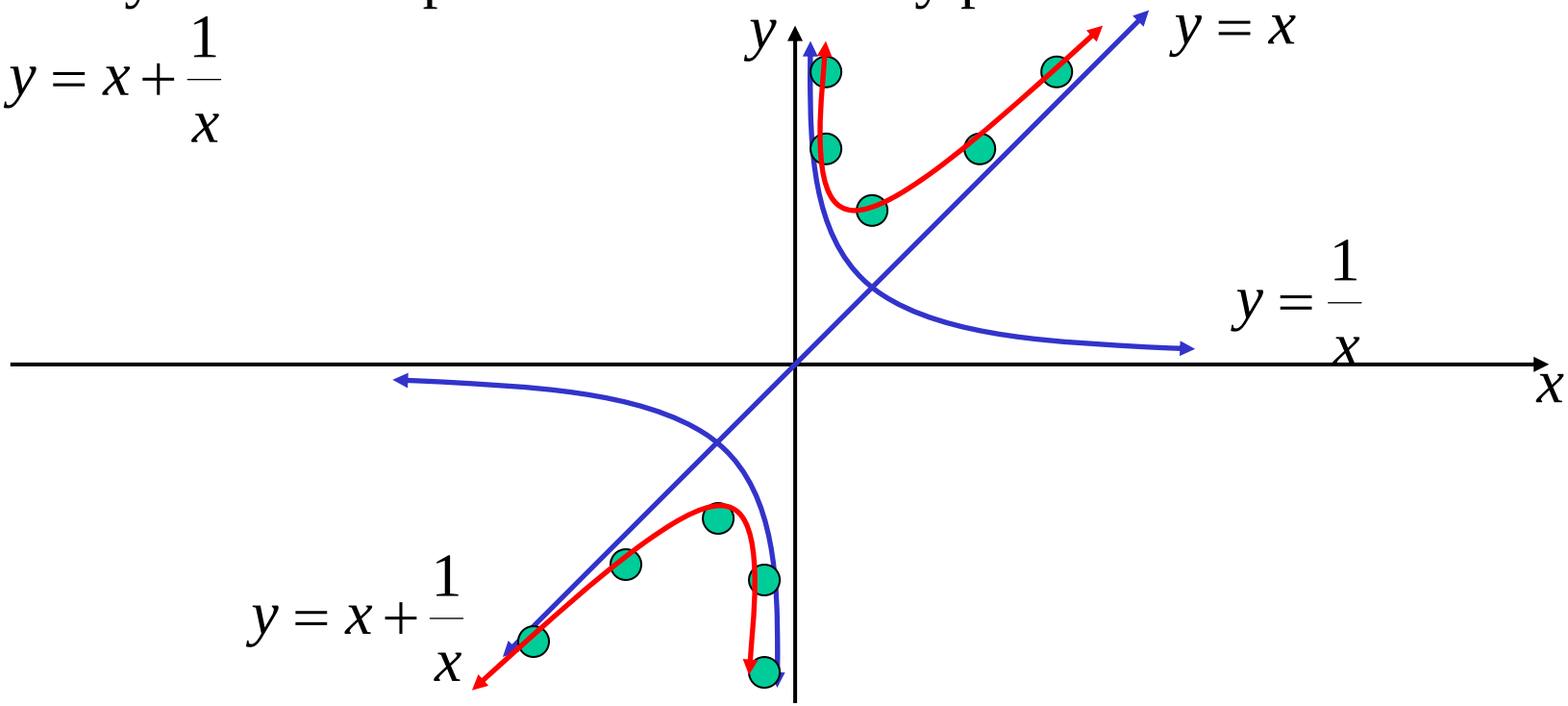
(D) Addition & Subtraction of Ordinates

$y = f(x) + g(x)$ can be graphed by first graphing $y = f(x)$ and $y = g(x)$ separately and then adding their ordinates together.

NOTE: First locate points on $y = f(x) + g(x)$ corresponding to $f(x)=0$ and $g(x)=0$, then plot further points by addition and subtraction of ordinates and finally locate the position of stationary points.

e.g. $y = x + \frac{1}{x}$

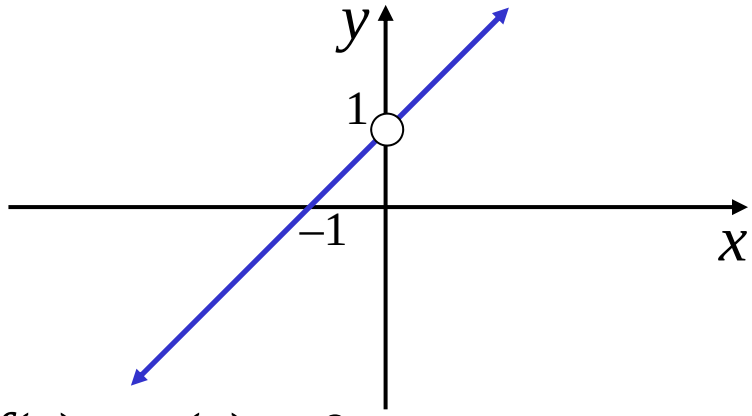


Things to keep in mind:

Discontinuities: any exclusions in the domain of the original function(s) remain in the new function

e.g. $f(x) = x + \frac{1}{x}$, $g(x) = 1 - \frac{1}{x}$

$$y = f(x) + g(x)$$
$$= x + 1 \ , \ x \neq 0$$



***x*-intercept:** If $f(x) = -g(x)$, then $y = f(x) + g(x) = 0$

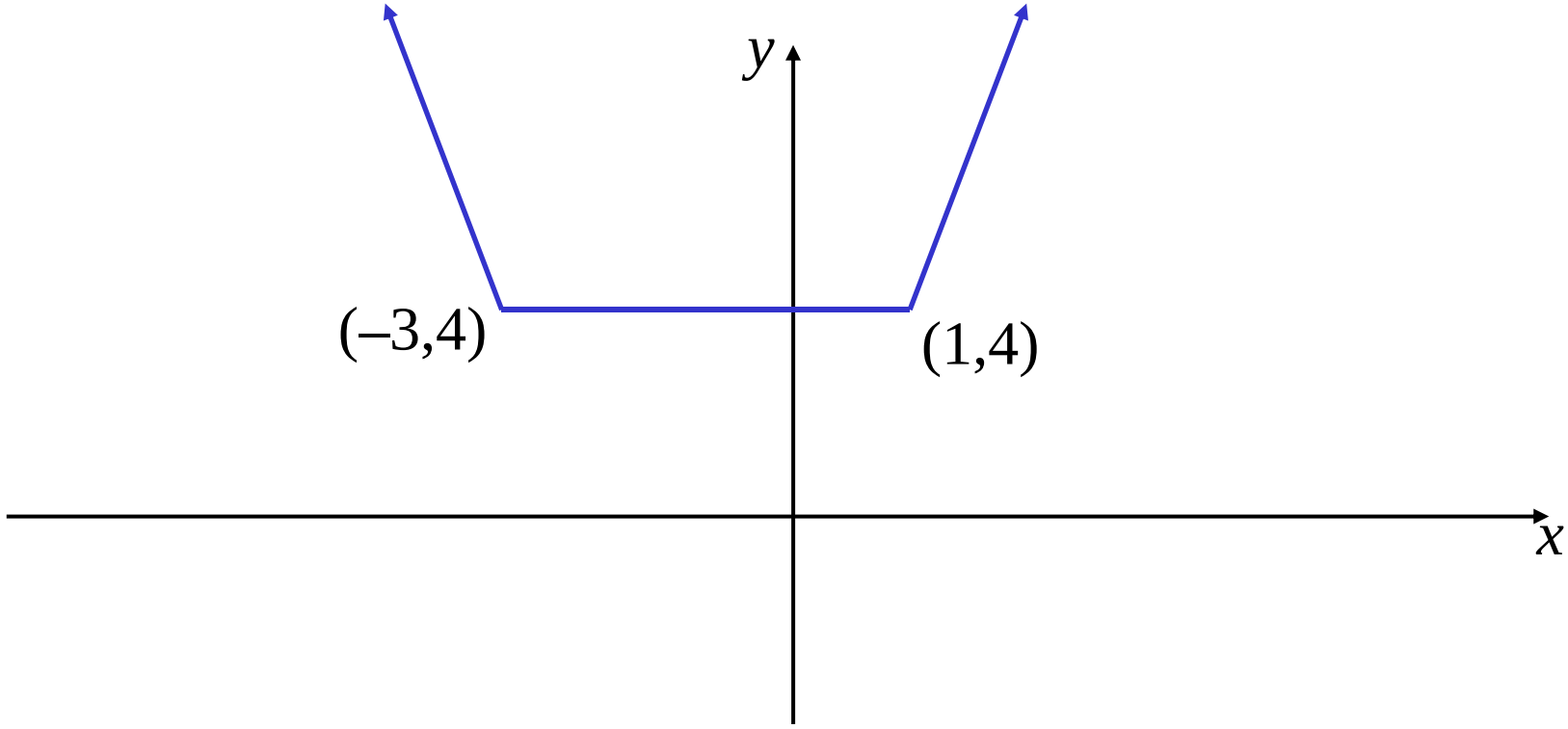
symmetry: like functions retain symmetry when added

odd function + odd function = odd function

even function + even function = even function

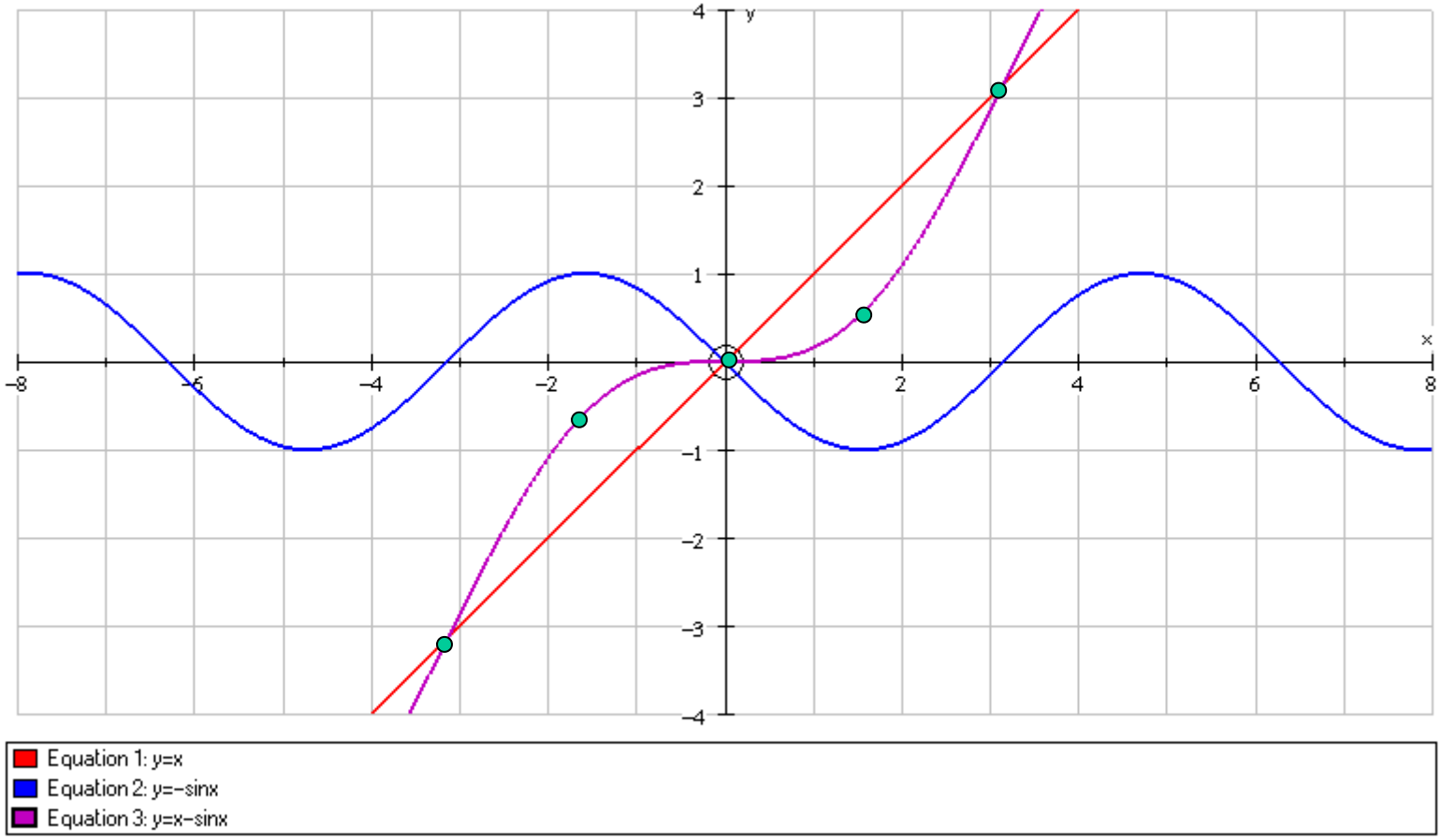
e.g. $y = |x+3| + |1-x|$

$x \le -3;$	$-3 < x < 1;$	$x \ge 1;$
$y = -(x+3)+(1-x)$	$y = (x+3)+(1-x)$	$y = (x+3)-(1-x)$
$y = -x-3+1-x$	$y = x+3+1-x$	$y = x+3-1+x$
$y = -2x-2$	$y = 4$	$y = 2x+2$



$y = f(x) - g(x)$ can be graphed by first graphing $y = f(x)$ and $y = -g(x)$ separately and then adding the ordinates together.

e.g. $y = x - \sin x$



***"Cambridge"*: Exercise 8B; 1 to 7**