

## Exercises with Function Properties

**(1)** If  $f(x) = \begin{cases} x^2 & \text{if } x \geq 0 \\ 2x - 1 & \text{if } x < 0 \end{cases}$ ,  $g(x) = \begin{cases} x + 1 & \text{if } x \geq 0 \\ x - 1 & \text{if } x < 0 \end{cases}$ ,  $h(x) = \begin{cases} 2x + 1 & \text{if } x \geq 0 \\ |x - 1| & \text{if } x < 0 \end{cases}$ ,

$$j(x) = \begin{cases} 3x + 1 & \text{if } x \geq 0 \\ -3x - 1 & \text{if } x < 0 \end{cases},$$

fill in the table and sketch the graphs of the functions:

$x$	-3	-2	-1	0	1	2	3
$f(x)$							
$g(x)$							
$h(x)$							
$j(x)$							

Solution

Find the range of each function, assuming that the domain is  $[-3, 3]$ .

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## Solutions

(1)

$x$	-3	-2	-1	0	1	2	3
$f(x)$	-7	-5	-3	0	1	4	9
$g(x)$	-4	-3	-2	1	2	3	4
$h(x)$	4	3	2	1	3	5	7
$j(x)$	8	5	2	1	4	7	10

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The range of  $f$  is  $[-7, -1) \cup [1, 9]$ , of  $g$ :  $[-4, -1) \cup [1, 4]$ , of  $h$ :  $[1, 7]$ , of  $j$ :  $(-1, 10]$ .

