

## Chapter 2.3 Check Your Understanding

### Exercises 1–5 True or False. Give reasons.

1. If the function  $f$  has a positive zero and  $g(x) = f(x - 2)$ , then  $g$  must have a positive zero.

**Answer:**

True; the graph of  $g$  is shifted 2 units to the right and therefore it must also have a positive zero.

2. If the function  $f$  has a zero between 1 and 2 and  $g(x) = f(x + 2)$ , then  $g$  must have a negative zero.

**Answer:**

True; the graph of  $g(x) = f(x - 2)$  is the graph of  $f$  shifted to the right 2 units.

3. If the graphs of  $y = f(x)$  and  $y = g(x)$  intersect in Quadrants I and III, then the graphs of  $y = f(-x)$  and  $y = g(-x)$  must intersect in Quadrants II and IV.

**Answer:**

True; the graph of  $g$  is reflected about the  $y$ -axis so that intersections in quadrants II and IV will be reflected about the  $y$ -axis to quadrants I and III.

4. If the graphs of  $y = f(x)$  and  $y = g(x)$  intersect in Quadrants II and IV, then the graphs of  $y = -f(x)$  and  $y = -g(x)$  must intersect in Quadrants I and III.

**Answer:**

True; if  $(-a, b)$  is a point of intersection of  $f$  and  $g$  in the second quadrant, then  $(-a, -b)$  will be a point of intersection of  $y = -f(x)$  and  $y = -g(x)$  and  $(-a, -b)$  is in QIII. Similarly for an intersection point for  $f$  and  $g$  in QIV, the corresponding point for  $y = -f(x)$  and  $y = -g(x)$  is in QI.

5. If the graph of  $y = f(x)$  contains points in Quadrants III and IV, then the graph of  $y = f(x) - 2$  must also contain points in Quadrants III and IV.

**Answer:**

True; the graph of  $g$  is shifted down 2 units and therefore it must also contain points in quadrants III and IV.

Exercises 6–10 Fill in the blank so that the resulting statement is true. If calculator graphs of  $f$  and  $g$  are drawn using  $[-10, 10] \times [-10, 10]$ , then the display will show the graphs intersecting in Quadrant(s) \_\_\_\_\_.

6.  $f(x) = x^2 - 2x - 7, g(x) = -f(x) - 5$

**Answer:**

The graphs of  $f(x) = x^2 - 2x - 7$  and  $g(x) = -f(x) - 5$  intersect in QIII and QIV.

7.  $f(x) = x^2 - 4x - 4, g(x) = f(x - 4)$

**Answer:**

QIV

8.  $f(x) = x^2 - 2|x| - 3, g(x) = -f(x) + 3$

**Answer:**

QI and QII

9.  $f(x) = 2x - 5, g(x) = f(-x) + 15$

**Answer:**

QI

10.  $f(x) = |x| - 2, g(x) = -f(x) + 3$

**Answer:**

QI and QII