

Chapter 2.7 Check Your Understanding

Exercises 1–5 True or False. Give reasons. For these exercises, assume that f is a function that has an inverse.

1. If the graph of f contains points in Quadrant III, then the graph of f^{-1} must also contain points in Quadrant III.

Answer:

True; since the graphs of f and f^{-1} are symmetric with respect to the line $y = x$.

2. If $(-2, -3)$ is a point on the graph of f , then $(2, 3)$ must be a point on the graph of f^{-1} .

Answer:

False; if $(-2, -3)$ is on the graph of f , then all we can say is that $(-3, -2)$ is on the graph of f^{-1} .

3. If the graph of f is a line having negative slope, then the graph of f^{-1} must be a line also with negative slope.

Answer:

True; since the graphs of f and f^{-1} are symmetric with respect to the line $y = x$.

4. If the graph of f has a y -intercept point, then the graph of f^{-1} must have an x -intercept point.

Answer:

True; if $(0, b)$ is on the graph of f , then $(b, 0)$ is on the graph of f^{-1} .

5. The graph of any function that has an inverse cannot cross the x -axis at more than one point.

Answer:

True; if the graph crossed the x -axis at more than one point, f would not be a one-one function.

Exercises 6–10 Fill in the blank so that the resulting statement is true.

6. If $f(-2) = 4$, then $f^{-1}(4) = \underline{\hspace{2cm}}$.

Answer:

If $f(-2) = 4$, then $(-2, 4)$ is on the graph of f , so $(4, -2)$ is on the graph of f^{-1} , or $f^{-1}(4) = -2$.

7. If the graph of f^{-1} contains points in Quadrants I and II, then the graph of f must contain points in Quadrants _____.

Answer:

I and IV; because the graph of f is symmetric with respect to the line $y = x$.

8. If the graph of f contains points in Quadrant II, then the graph of f^{-1} must contain points in Quadrant _____.

Answer:

Suppose $(-a, b)$ is in QII and on the graph of f , then $(b, -a)$ is on the graph of f^{-1} , and $(b, -a)$ is in QIV.

9. If $f(2) = -5$, then a point on the graph of f^{-1} is _____.

Answer:

If $f(2) = -5$, then $(2, -5)$ is on the graph of f , and $(-5, 2)$ must be on the graph of f^{-1} .

10. For $f(x) = x^3 + x^2 + x - 4$, if you draw graphs of $y = f(x)$, $y = f^{-1}(x)$, and $y = x$ on the same screen, then the display will show that all three graphs intersect at a point in Quadrant _____.

Answer:

For $f(x) = x^3 + x^2 + x - 4$ draw graphs of $y = f(x)$, $y = f^{-1}(x)$, and $y = x$ on the same screen (see technology tip on page 128, or use parametric equations if necessary). The three graphs intersect in QI.