

Transformations of Functions

In Exercises 1 – 19, graph each function. Label the coordinates of the critical point that have been transformed. State the domain and range.

1. $f(x) = -x^2$

2. $h(x) = \sqrt[3]{-x}$

3. $f(x) = \sqrt{x} - 5$

4. $g(x) = \sqrt[3]{x-5} + 1$

5. $h(x) = -2|x|$

6. $g(x) = (x-6)^2 + 3$

7. $f(x) = \frac{3}{x} + 2$

8. $h(x) = -\sqrt{x-4} - 2$

9. $g(x) = \frac{1}{x+2}$

10. $f(x) = (x-4)^3 + 1$

11. $y = -2\sqrt[3]{x}$

12. $y = |3x-6|$

13. $y = \sqrt{5-x}$

14. $y = 2(x+3)^3 - 1$

15. $y = -\frac{1}{2}(x+2)^2$

16. $y = \frac{1}{2x-4} - 3$

17. $y = \frac{1}{(x+4)^2} - 2$

18. $y = -2\sqrt{x-4} + 3$

19. $y = |5-x| - 3$

Write a rule for the function whose graph can be obtained from the given parent function by performing the given transformations.

20. Parent function: $f(x) = \sqrt{x}$

Transformations: reflect the graph across the x -axis and shift it upward 3 units

21. Parent function: $g(x) = |x|$

Transformations: stretch the graph vertically by a factor of 2, shift the graph 6 units to the right, and shift it downward 3 units

22. Parent function: $h(x) = \frac{1}{x}$

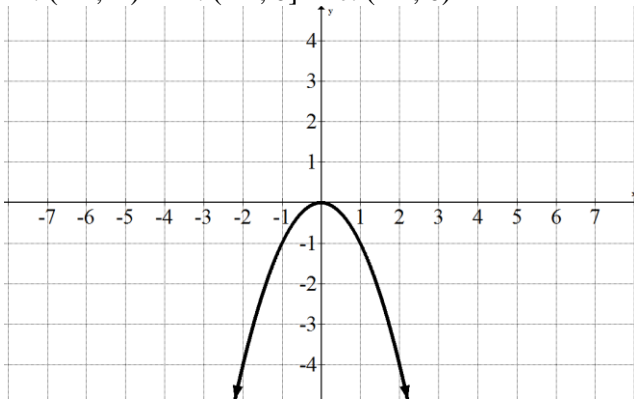
Transformations: reflect the graph across the y -axis, stretch it vertically by a factor of 3, and shift it left 5 units

23. Parent function: $k(x) = x^3$

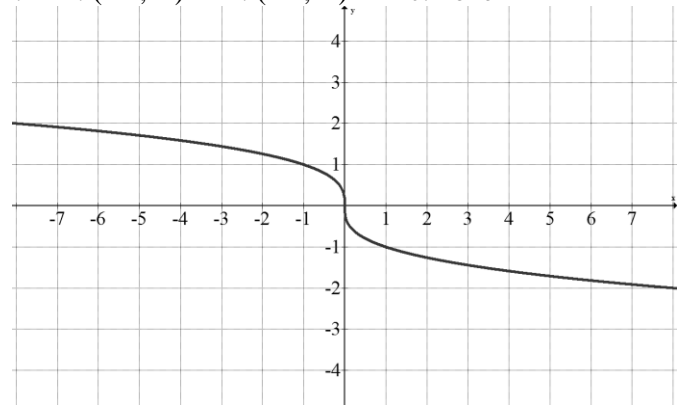
Transformations: compress the graph vertically by a factor of $\frac{1}{4}$, and shift the graph right 3 and down 2 units

Answers

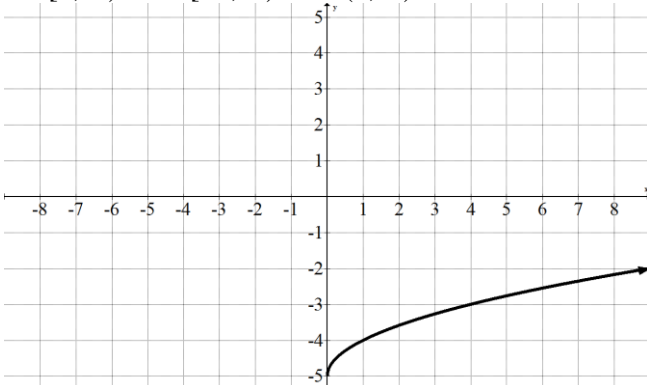
1. D: $(-\infty, \infty)$ R: $(-\infty, 0]$ Inc: $(-\infty, 0)$



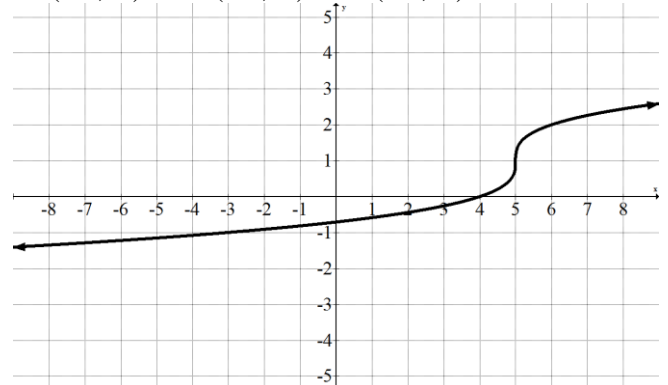
2. D: $(-\infty, \infty)$ R: $(-\infty, \infty)$ Inc: none



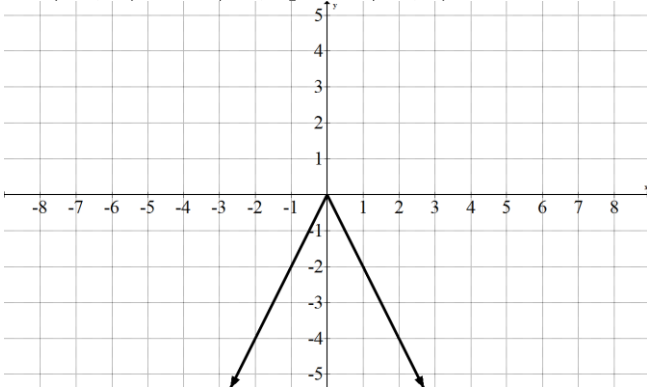
3. D: $[0, \infty)$ R: $[-5, \infty)$ Inc: $(0, \infty)$



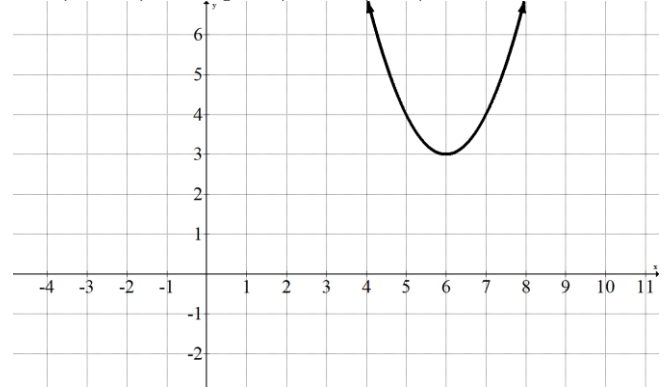
4. D: $(-\infty, \infty)$ R: $(-\infty, \infty)$ Inc: $(-\infty, \infty)$



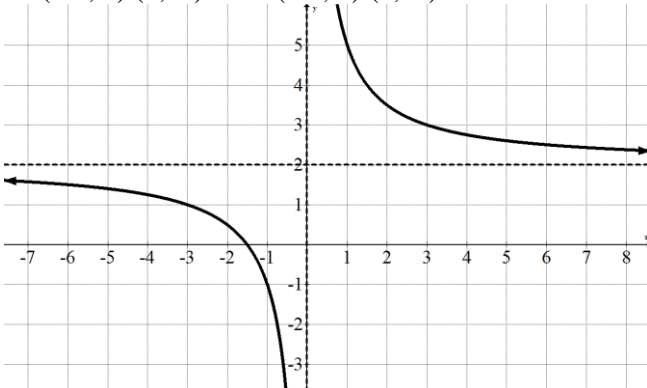
5. D: $(-\infty, \infty)$ R: $(-\infty, 0]$ Inc: $(-\infty, 0)$



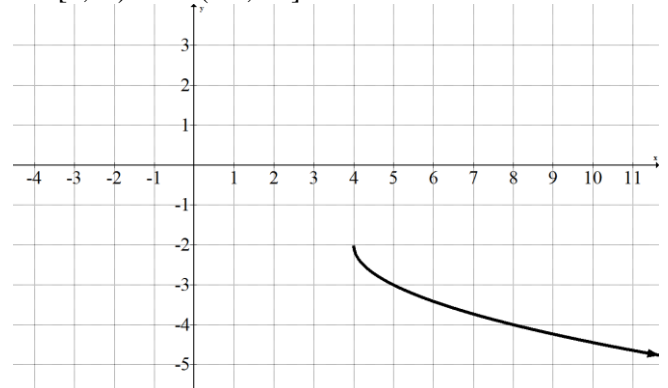
6. D: $(-\infty, \infty)$ R: $[3, \infty)$ Inc: $(6, \infty)$



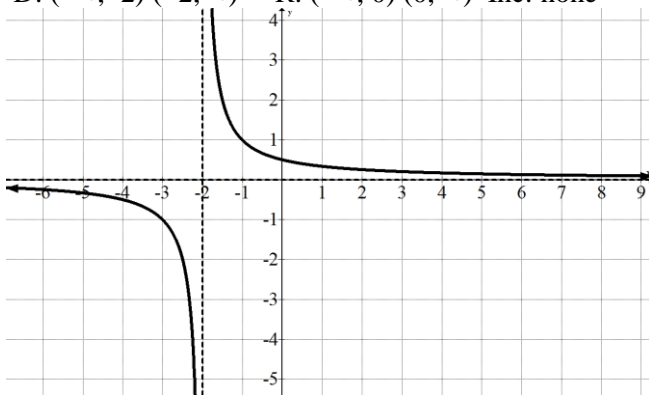
7. D: $(-\infty, 0) \cup (0, \infty)$ R: $(-\infty, 2) \cup (2, \infty)$ Inc: none



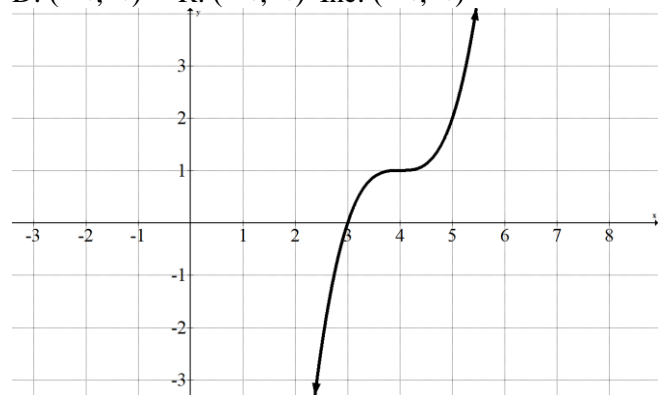
8. D: $[4, \infty)$ R: $(-\infty, -2]$ Inc: none



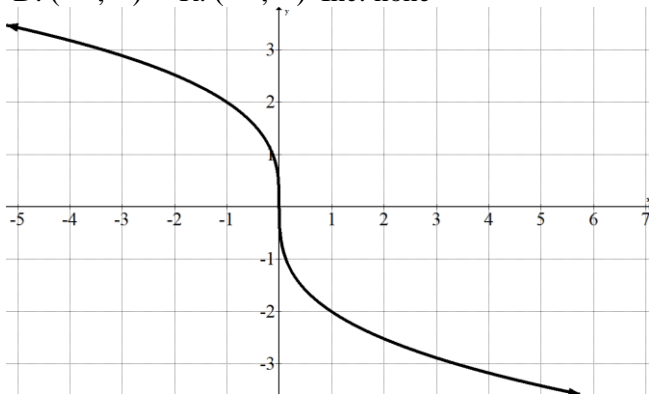
9. D: $(-\infty, -2) \cup (-2, \infty)$ R: $(-\infty, 0) \cup (0, \infty)$ Inc: none



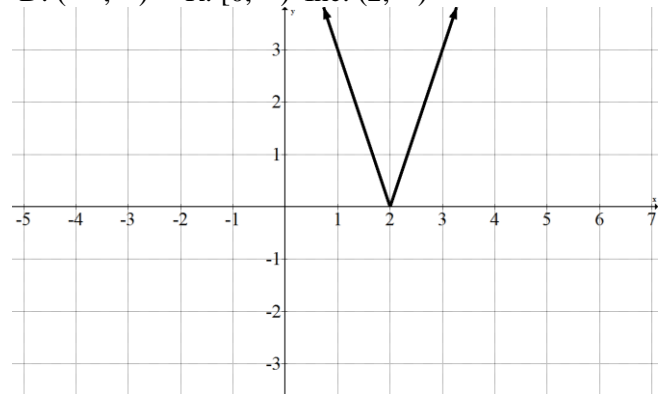
10. D: $(-\infty, \infty)$ R: $(-\infty, \infty)$ Inc: $(-\infty, \infty)$



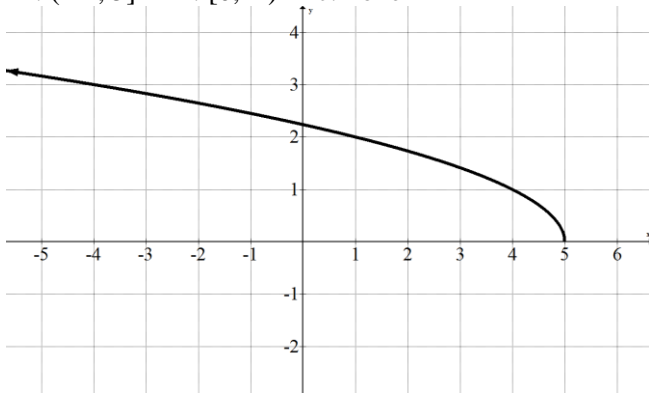
11. D: $(-\infty, \infty)$ R: $(-\infty, \infty)$ Inc: none



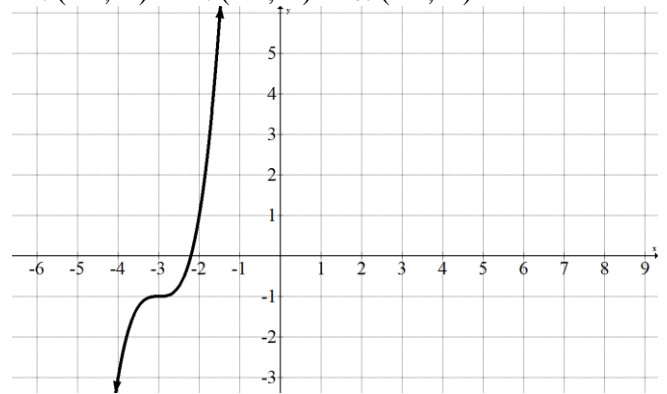
12. D: $(-\infty, \infty)$ R: $[0, \infty)$ Inc: $(2, \infty)$



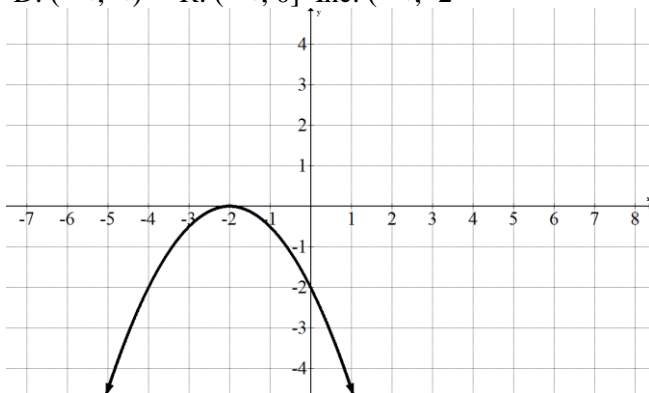
13. D: $(-\infty, 5]$ R: $[0, \infty)$ Inc: none



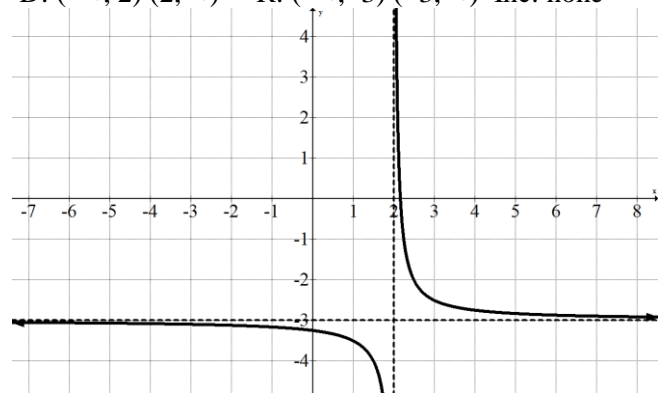
14. D: $(-\infty, \infty)$ R: $(-\infty, \infty)$ Inc: $(-\infty, \infty)$



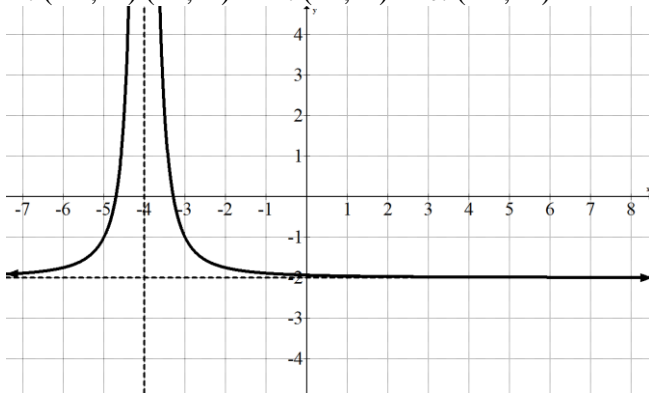
15. D: $(-\infty, \infty)$ R: $(-\infty, 0]$ Inc: $(-\infty, -2)$



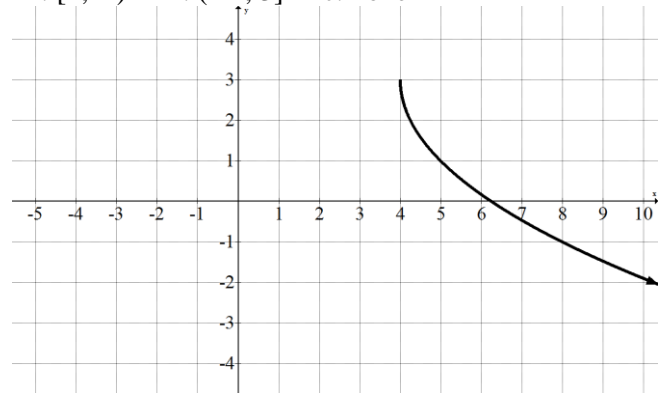
16. D: $(-\infty, 2) \cup (2, \infty)$ R: $(-\infty, -3) \cup (-3, \infty)$ Inc: none



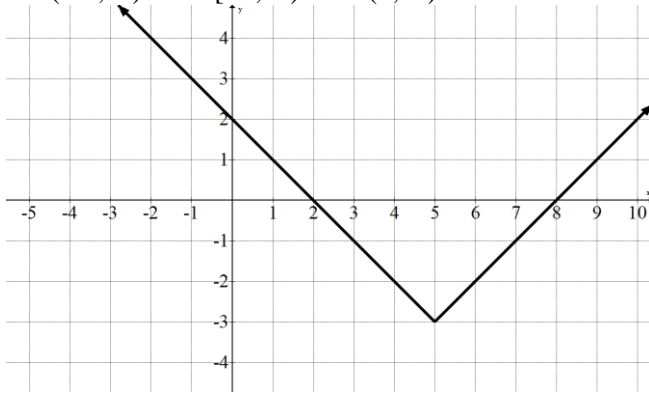
17. D: $(-\infty, -4) \cup (-4, \infty)$ R: $(-2, \infty)$ Inc: $(-\infty, -4)$



18. D: $[4, \infty)$ R: $(-\infty, 3]$ Inc: none



19. D: $(-\infty, \infty)$ R: $[-3, \infty)$ Inc: $(5, \infty)$



20. $f(x) = -\sqrt{x} + 3$

21. $g(x) = 2|x - 6| - 3$

22. $h(x) = -\frac{3}{x+5}$

23. $k(x) = \frac{1}{4}(x-3)^3 - 2$