

Factor each expression.

1) $x^3 - 4x$

2) $x^2 - 2x - 15$

3) $2x^2 + 7x - 15$

4) $x^4 - 6x^2 - 27$

5) $x^2 - xy - 6y^2$

6) $4x^4 - 10x^3 + 4x^2$

Solve each equation.

7) $x(2x+5) = 2(2x+3)$

8) $x^2 + 8x = 2$

9) $3x^2 - 2x = 2x + 7$

10) $(2x-1)^2 - 1 = 19$

State the Domain of each function.

11) $g(x) = x^2 + 4x + 6$

12) $h(x) = \sqrt{2x-5}$

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

14) $f(x) = \sqrt{9-x^2}$

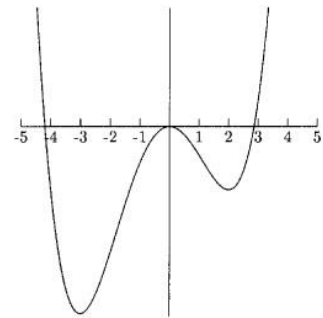
15) $t(v) = \sqrt{v^2-16}$

16) $g(x) = \frac{x}{2x-4}$

17) $q(w) = \frac{\sqrt{w+2}}{w^2-1}$

18) $f(x) = \frac{x}{\sqrt{2-x}}$

19) On what intervals is the graph to the right increasing? Decreasing?



Use the definition of even and odd functions to show if the functions below are even, odd, or neither.

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

21) $f(x) = x^3 + 2x$

23) $f(x) = x^3 - 2x + 1$

24) $f(x) = \frac{\sqrt{x^2-4}}{x}$

Graph the following piecewise functions.

25) $f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ x^2 + 3 & x < 1 \end{cases}$

26) $f(x) = \begin{cases} x^2 - 1 & x \leq 0 \\ 2x - 1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$

27) $f(x) = \begin{cases} 5 & x \leq -3 \\ -2x - 3 & x > -3 \end{cases}$

28) $f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ |x| & x < 1 \end{cases}$

29) Given $f(x) = x^2 + 2x - 1$ and $g(x) = 4x + 2$, find each of the following and state the domain:

a) $(f + g)(x)$

b) $(f - g)(x)$

c) $(fg)(x)$

d) $\left(\frac{f}{g}\right)(x)$

e) $g(f(x))$

f) $f(g(-1))$

30) Given $f(x) = 2x + 1$
 $g(x) = \sqrt{x-1}$, find each of the following and state the domain:

a) $(f + g)(x)$ b) $(f - g)(x)$ c) $(fg)(x)$

d) $\left(\frac{f}{g}\right)(x)$ e) $g(f(x))$ f) $f(g(x))$

Given f , find f^{-1}

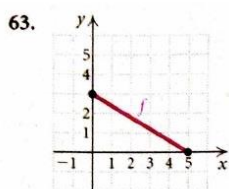
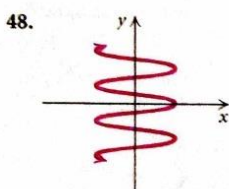
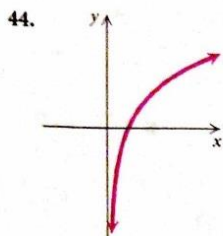
33) $f(x) = (x-1)^2 - 2$

34) $f(x) = \sqrt{x^3 - 2}$

35) $f(x) = \frac{x+1}{x-3}$

36) $f(x) = \frac{x+4}{x+1}$

37) For each graph below, is f a function? Is f^{-1} a function? Is f one to one?

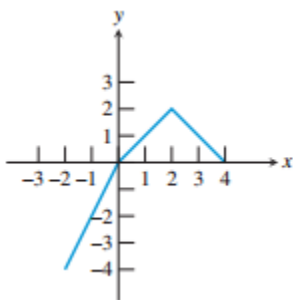


For each of the following verify that $f(x)$ and $g(x)$ are inverses using the definition of inverses.

38) $f(x) = x^2 + 1$
 $g(x) = \sqrt{x-1}$

39) $f(x) = \sqrt[3]{x^2 + 1}$
 $g(x) = \sqrt{x^3 - 1}$

40) Below is the graph of f . Sketch the graph of a) $y = f(x+1) - 2$, b) $y = f(-x)$, c) $y = f(-x+1) - 3$, and d) $y = 2f(2x)$.



Graph each of the following functions.

41) $f(x) = 2(x-1)^2 + 3$

42) $f(x) = |-2x + 4| - 4$

43) $f(x) = 3(-x+1)^3$

44) $f(x) = (-2x+4)^3 + 1$

45) $f(x) = 2\sqrt{3x}$

46) $f(x) = -2|x+1| + 3$

47) $f(x) = -\sqrt{\frac{1}{2}x-1} + 2$

48) $f(x) = -2\sqrt[3]{x}$

Review the 12 basic functions and their properties – Domain, Range, Continuity, Increasing/Decreasing, Symmetry, Boundedness, Extrema, Asymptotes, and End Behavior