

Let $f(x) = 2x + 5$, $g(x) = x^2 - 10$, and $h(x) = 3x - 8$. Find:

- 1) $f(g(3)) = f(-1) = 3$ 2) $g(h(0)) = g(-8) = 54$ 3) $h(f(-1)) = h(3) = 1$
- 4) $g(f(h(0))) = g(f(-8)) = g(-11) = 111$ 5) $f(f^{-1}(x)) = x$ 6) $h(h(x)) = h(3x-8) = 9x-32$

Let $f(x) = \frac{1}{2}x + 1$, $g(x) = 2x - 2$, and $h(x) = 4x$. Find:

- 7) $f \circ g(n) = f(2n-2) = n$ 8) $h \circ f(t) = h(\frac{1}{2}t+1) = 2t+4$
- 9) $g \circ h(z) = g(4z) = 8z-2$
- 10) $g \circ f(-c) = g(-\frac{1}{2}c+1) = -c$ 11) $f \circ h(-n) = f(-4n) = -2n+1$ 12) $h \circ g(-y) = h(-2y-2) = -8y-8$

State the parent function and determine what translations happened to change it from the parent function to the function that is given.

- 13) $f(x) = -2|x+2| - 2$
 PF = $|x|$
 reflect over x-axis
 vertical stretch of 2 (narrower)
 Left + 2
 Down 2
- 14) $g(x) = (2x+3)^3 - 2$
 PF = x^3
 Left + $\frac{3}{2}$
 Down 2
 * Horizontal stretch $\frac{1}{2}$
- 15) $h(x) = \frac{1}{2}(x-3)^2$
 PF = x^2
 vertical stretch of $\frac{1}{2}$ (wider)
 Right + 3
- 16) $k(x) = -\sqrt{5-x} + 3 = -\sqrt{-(x-5)} + 3$
 PF = \sqrt{x}
 Reflect over x-axis
 Reflect over y-axis
 Right + 5
 Up 3

Is the function even, odd or neither?

- 17) $5x^2$
 $5(-1)^2 = 5(+1)^2$ Even
- 18) $\sqrt[3]{x} + 5$
 $\sqrt[3]{1} + 5 \neq \sqrt[3]{-1} + 5$ Neither
 $6 \neq 4$
- 19) $8x^4 - 2x^2$
 $8(1)^4 - 2(1)^2 = 8(-1)^4 - 2(-1)^2$ Even
- 20) $|x| - x$
 $|-1| - (-1) \neq |1| - 1$
 $0 \neq 2$ Neither
- 21) $-2x^3 + 4x^2$
 $-2(1)^3 + 4(1)^2 \neq -2(-1)^3 + 4(-1)^2$
 $2 \neq 6$ Neither
- 22) $4x + \frac{1}{x}$
 $4(1) + \frac{1}{1} \neq 4(-1) - \frac{1}{1}$
 $5 \neq -5$ odd

For the following functions, (a) find the domain, (b) find the range and (c) find the zeros

$$32 - 2x^2 \geq 0$$

$$x^2 \leq 16$$

24) $a(x) = \{(1,3), (4,-2), (5,0), (0,6), (-3,3)\}$

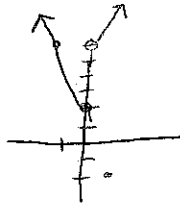
25) $b(x) = \sqrt{32 - 2x^2}$

a) $x \in \{-3, 0, 1, 4, 5\}$

c) zeros $\rightarrow x=5$

a) $x \in [-4, 4]$

b) $y \in \{-2, 0, 3, 6\}$



b) $y \in [0, 4\sqrt{2}]$

c) $x = -4$ or $x = 4$

26) $c(x) = \begin{cases} -4x+2 & \text{if } x \leq 0 \\ 6+x & \text{if } x > 0 \end{cases}$

27) $d(x) = \lceil 2x \rceil + 1$

a) $x \in \mathbb{R}$

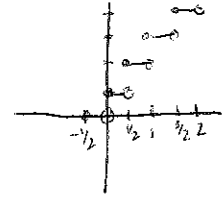
a) $x \in \mathbb{R}$

b) $y \in [2, \infty)$

b) $y \in \mathbb{Z}$

c) None

c) $x \in [-1/2, 0)$



Tell if the relation is symmetric with respect to the x-axis, y-axis and/or origin.

28) $2y = 4x^2 + 3$

y-axis

29) $4y = |x|$

y-axis

30) $9y^3 = 6x^2 - 7$

y-axis

31) $2y = \frac{5}{x}$

origin

32) $y = 4x^2 + 5x + 8$

None

33) $8y^4 = 6x^2 - 5$

x-axis

+
y-axis

origin

Graph each function on a separate piece of graph paper.

34) $f(x) = \lceil 2x \rceil + 7$

35) $f(x) = \lceil x \rceil - x$

$f(4) = 0$ $f(1/2) = -1/2$
 $f(-1/2) = -1/2$ $f(1) = 0$
 $f(0) = 0$ $f(3/2) = -1/2$

36) $f(x) = \begin{cases} x, & \text{if } x > -2 \\ x^2 + 3x, & \text{if } x \leq -2 \end{cases}$

37) $f(x) = \begin{cases} |x^2 - 1| & \text{if } x \geq -1 \\ 2x^2 - 5, & \text{if } x < -1 \end{cases}$

38) $f(x) = \begin{cases} 3x+2, & \text{if } x \geq 1 \\ 5x, & \text{if } x < 1 \end{cases}$

39) $f(x) = \begin{cases} x-8, & \text{if } x > -3 \\ 2x+2, & \text{if } x \leq -3 \end{cases}$

List the transformations

40) $f(x) - 5$

Down 5

41) $f(-x) + 3$

reflect over y-axis
up 3

42) $4f(x+1)$

vertical stretch of 4 (Narrower)
Left + 1

43) $-2f(x+6)$

Reflect over x-axis
Vertical stretch of 2 (Narrower)
Left 6

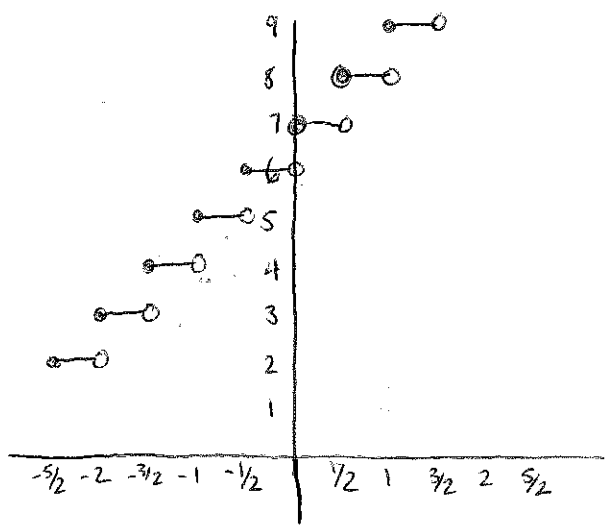
44) $-\frac{f(x)}{2}$

reflect over x-axis
Vertical stretch of 1/2 (wider)

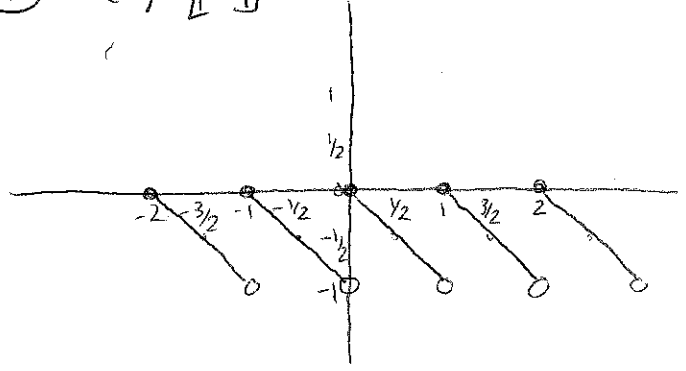
45) $\frac{f(x)+5}{4}$

Vertical stretch of 1/4 (wider)
up 5/4

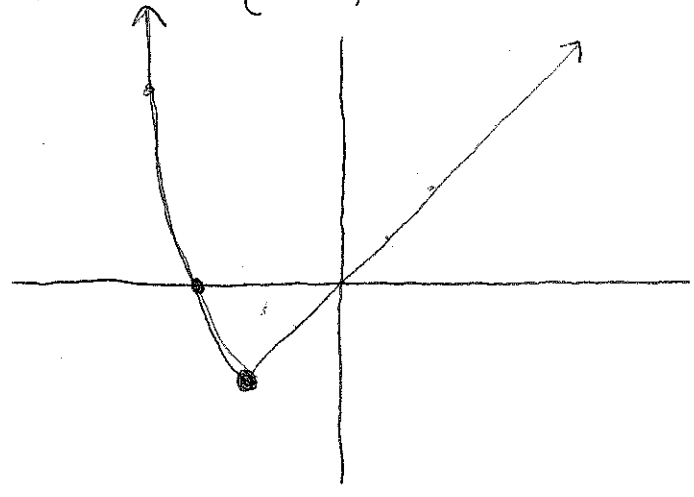
(34) $f(x) = \lfloor 2x \rfloor + 7$



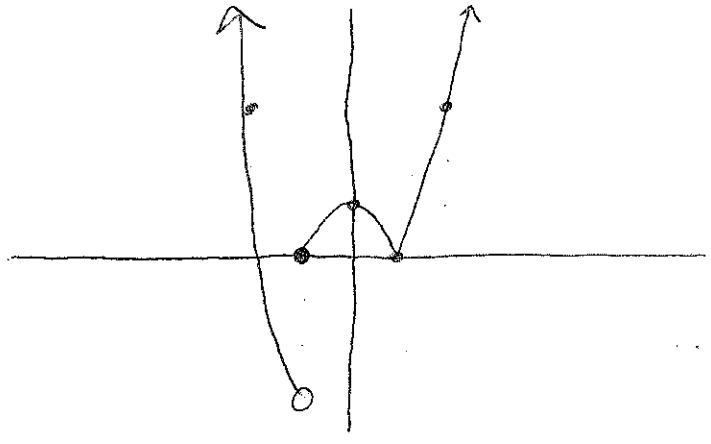
(35) $f(x) = \lfloor x \rfloor - x$



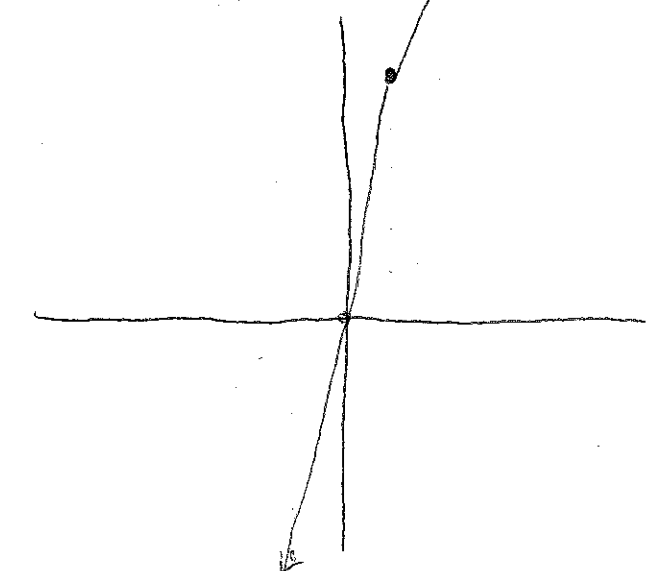
(36) $f(x) = \begin{cases} x & , x > -2 \\ x^2 + 3x & , x \leq -2 \end{cases}$



(37) $f(x) = \begin{cases} |x^2 - 1| & , x \geq -1 \\ 2x^2 - 5 & , x < -1 \end{cases}$



(38) $f(x) = \begin{cases} 3x + 2 & , x \geq 1 \\ 5x & , x < 1 \end{cases}$



(39) $f(x) = \begin{cases} x - 8 & , x > -3 \\ 2x + 2 & , x \leq -3 \end{cases}$

