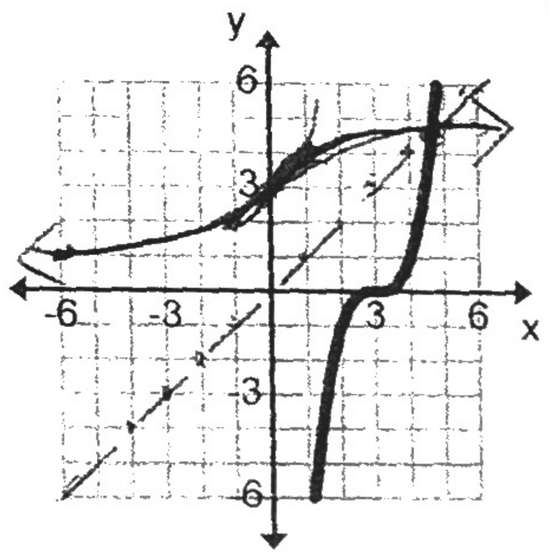
Pre-Calculus Worksheet Name: KEY Per.____

#3 WS: Piece-wise, Greatest Integer Functions, and Solving Equations

Given the following, **graph its inverse** and find the **inverse function**.

1.



$f(x) = (x-3)^3$

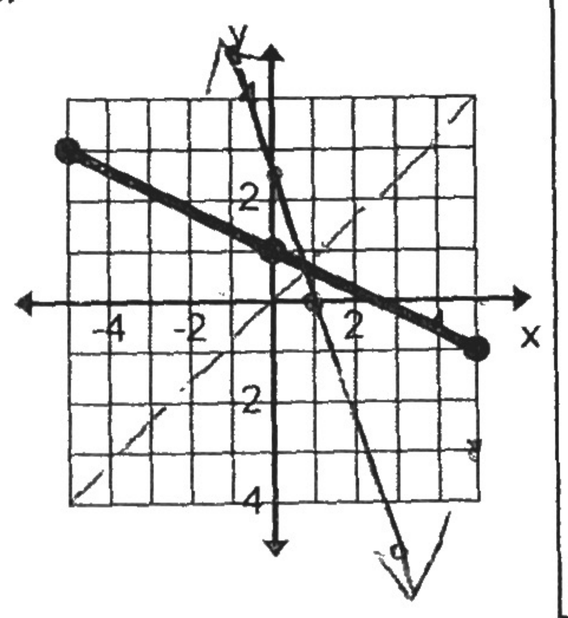
$x = (y-3)^3$

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

$\sqrt[3]{x} + 3 = y$

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

2.



$f(x) = \frac{-2}{5}x + 1$

$x = -\frac{2}{5}y + 1$

$x - 1 = -\frac{2}{5}y$

$\frac{5x}{-2} - \frac{5}{-2} = \frac{-2y}{-2}$

$f^{-1}(x) = -\frac{5}{2}x + \frac{5}{2}$

Evaluate the following given the functions:

$$f(x) = \begin{cases} 3 - x^2, & x \le -1 \\ 2x + 5, & x > -1 \end{cases} \qquad g(x) = [\![2x]\!] + 1 \qquad h(x) = \begin{cases} |x+2|, & x > -3 \\ x^2, & x < -3 \\ 6, & x = 3 \end{cases} \qquad j(x) = -[\![x]\!] + 2$$

3. $f(-3) = 3 - (-3)^2 = 3 - 9 = -6$

4. $g(-2.3) = [\![2 \cdot (-2.3)]\!] + 1 = [\![-4.6]\!] + 1 = -5 + 1 = -4$

5. $h(3) = 5$

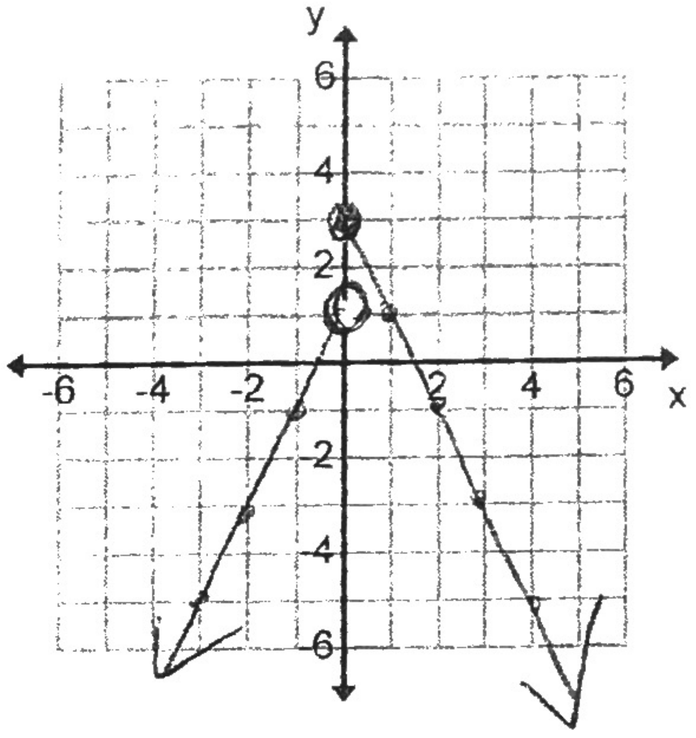
6. $j(5.\overline{9}) = -[\![5.9]\!] + 2 = -5 + 2 = -3$

7. $f(6) = 2 \cdot 6 + 5 = 12 + 5 = 17$

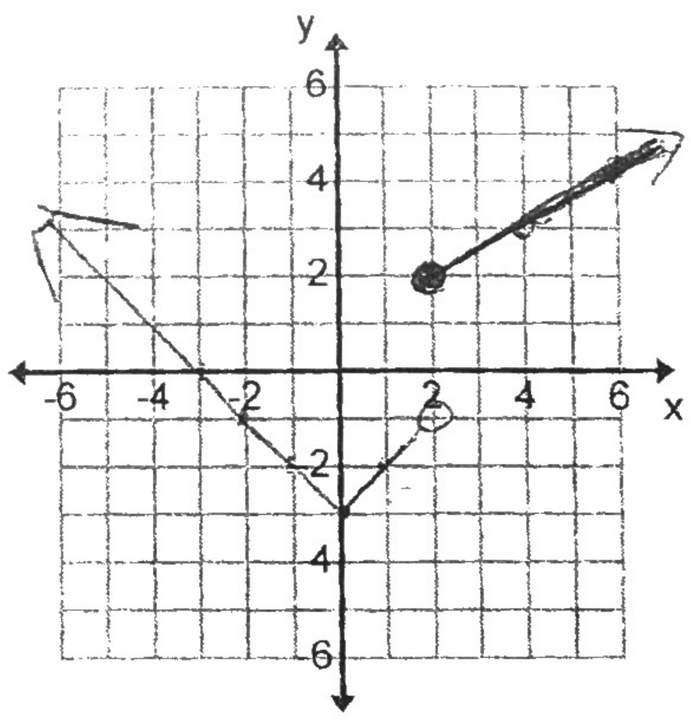
8. $h(-7) = (-7)^2 = 49$

Graph each piece-wise function. Then find the domain and range.

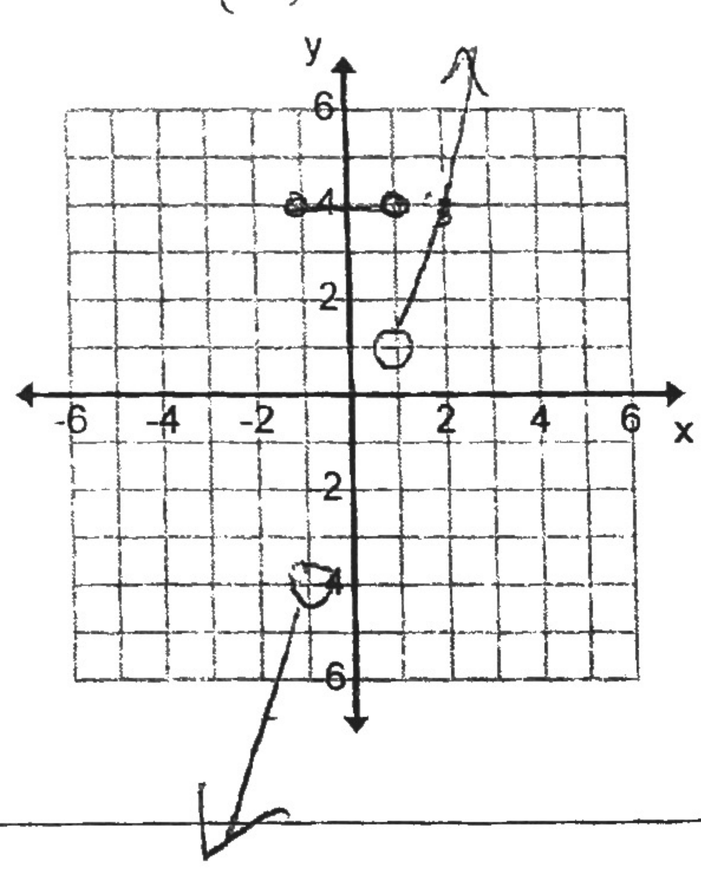
9. $f(x) = \begin{cases} 2x + 1, & x < 0 \\ -2x + 3, & x \ge 0 \end{cases}$



10. $h(x) = \begin{cases} |x| - 3, & x < 2 \\ \frac{1}{2}x + 1, & x \ge 2 \end{cases}$

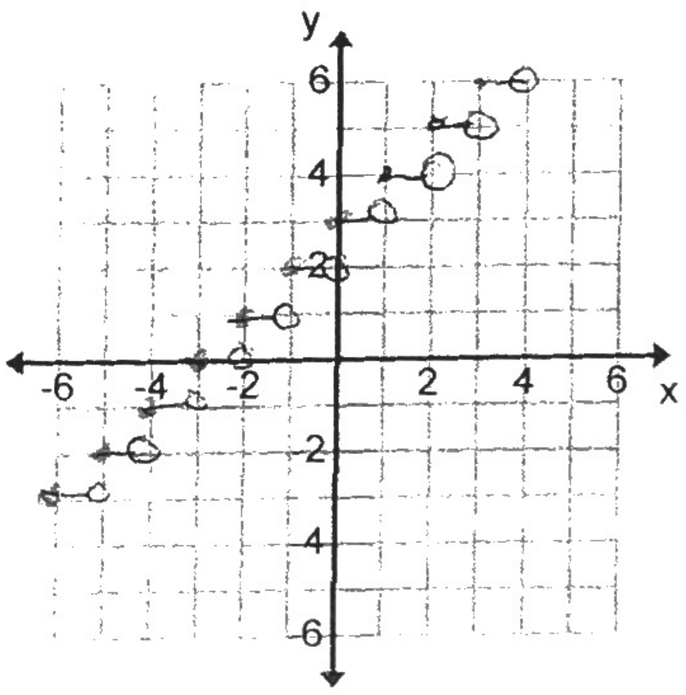


11. $j(x) = \begin{cases} 3x - 1, & x < -1 \\ 4, & -1 \le x \le 1 \\ x^2, & x > 1 \end{cases}$

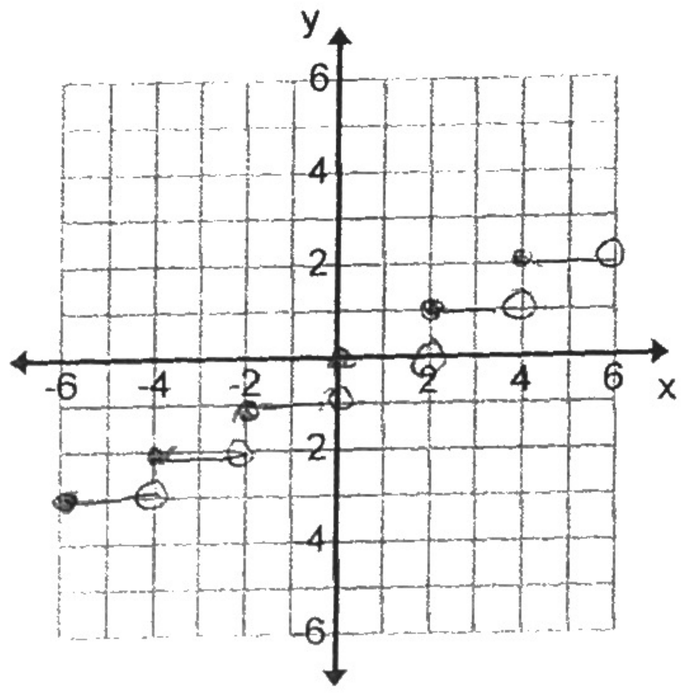


Graph each greatest integer function.

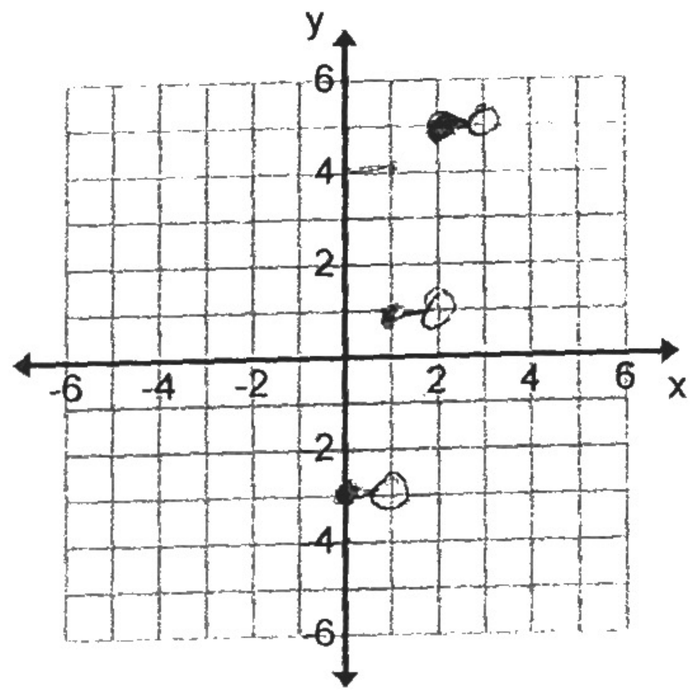
12. $f(x)=[\![x-1]\!]+4$



13. $g(x)=\left[\!\left[\frac{1}{2}x\right]\!\right]$



14. $h(x)=4[\![x]\!]-3$



Write the equation for $g(x)$ given the transformations of the parent function $f(x)=[\![x]\!]$.

15. $g(x)$ is the result of taking the function $f(x)$, stretching it vertically by a factor of 3, and translating it 4 units to the left and 6 units up

$g(x) = 3[\![x+4]\!]+6$

16. $g(x)$ is the result of taking the function $f(x)$, compressing it horizontally by a factor of $\frac{1}{5}$, reflecting it across the y-axis, and translating it down 5 units

$g(x) = [\![5(-x)]\!] - 5$

SOLVE EACH! NO GRAPHING ON THE CALCULATOR!!

17. $5x-2=4x+11$

$x=13$

18. $3(1-4x)-2(7x+1)=27$

$3-12x-14x-2=27$

$-26x+1=27$

$-26x=26$

$x=-1$

19. $x^2+6x+8=0$

$(x+4)(x+2)=0$

$x+4=0$ or $x+2=0$

$x=-4$ or $x=-2$

20. $x^2-5x+6=0$

$(x-3)(x-2)=0$

$x=3$ or $x=2$

21. $x^2-3x-4=0$

$(x-4)(x+1)=0$

$x=4$ or $x=-1$

22. $6x^2-7x-5=0$

$(3x-5)(2x+1)=0$

$3x-5=0$ or $2x+1=0$

$3x=5$ or $2x=-1$

$x=5/3$ or $x=-1/2$

23. $(x+3)^2=5$

$\sqrt{(x+3)^2}=\pm\sqrt{5}$

$x+3=\pm\sqrt{5}$

$x=-3\pm\sqrt{5}$

24. $x^3-x^2-2x+2=0$

$x^2(x-1)-2(x-1)=0$

$(x^2-2)(x-1)=0$

$x=\pm\sqrt{2}$ or $x=1$

25. $3x^5-6x^3=0$

$3x^3(x^2-2)=0$

$3x^3=0$ or $x^2-2=0$

$x^3=0$ or $x^2=2$

$x=0$ or $x=\pm\sqrt{2}$

26. $x^3=9x^2$

$x^3-9x^2=0$

$x^2(x-9)=0$

$x=0$ or $x=9$

27. $(\sqrt{2x+5})^2=(3)^2$

$2x+5=9$

$2x=4$

$x=2$

28. $\sqrt{5x-7}-\sqrt{x+10}=0$

$\sqrt{5x-7}=\sqrt{x+10}$

$5x-7=x+10$

$4x=17$

$x=17/4$