PRACTICEinverseOnetoone

September-24-13 7:29 PM

Practice Worksheet

For problems 1-14, find the inverse of the given function

1. $f(x) = 4x - 3$

2. $g(x) = \frac{3}{x}$

3. $h(x) = \frac{4x}{x-6}$

4. $g(x) = -\sqrt{x-11}$

5. $f(x) = \sqrt[3]{2x-4}$

6. $j(x) = \frac{7}{x-11}$

7. $h(x) = \sqrt[4]{3x-2}$

8. $j(x) = \sqrt{x-2} + 5$

9. $f(x) = -x^2 + 6$, when $x \geq 0$

10. $g(x) = x^4 - 8$, when $x \leq 0$

11. $h(x) = (x-1)^2$, when $x \geq 1$

12. $j(x) = (x+4)^2 + 9$, when $x \leq -4$

13. $f(x) = 3\sqrt{4-x}$

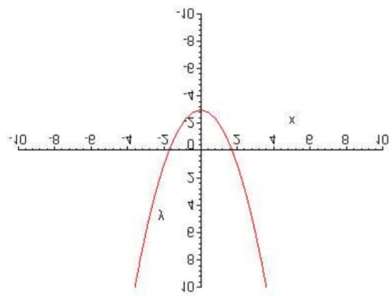
14. $g(x) = x^2 - 10x + 25$, when $x \geq 5$

Practice Worksheet

b) sketch inverse

~~For problems 15 ~ 20~~ a) , identify whether the function is one-to-one. c) restrict domain of original to ensure inverse is a function

13.



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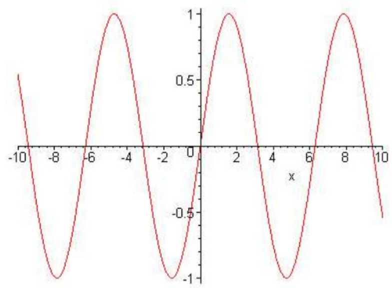

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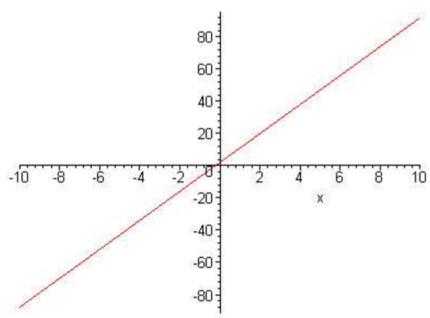
15.



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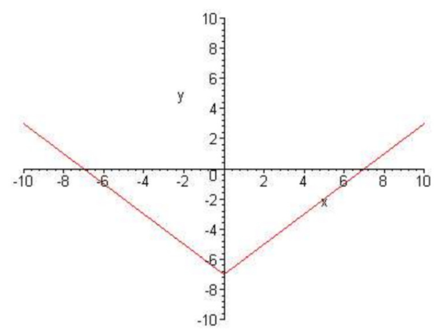

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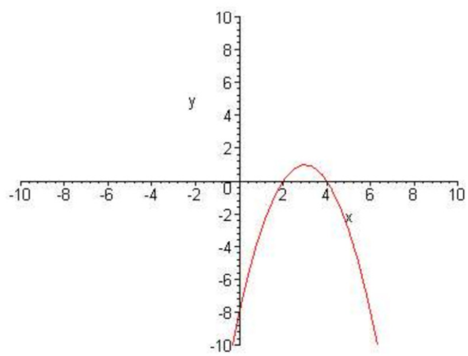

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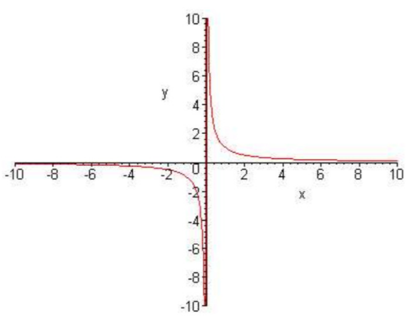

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Practice Worksheet

For problems 1-14, find the inverse of the given function

1. $f(x) = 4x - 3$

orig: $y = 4x - 3$

inverse: $x = 4y - 3$

$x + 3 = 4y$

$\frac{1}{4}(x+3) = y$

$\therefore f^{-1}(x) = \frac{1}{4}(x+3)$

2. $g(x) = \dfrac{3}{x}$

orig: $y = \frac{3}{x}$

inverse: $x = \frac{3}{y}$

$xy = 3$

$y = \frac{3}{x}$

$\therefore g^{-1}(x) = \frac{3}{x}$, $x \neq 0$

3. $h(x) = \dfrac{4x}{x-6}$

orig: $y = \frac{4x}{x-6}$

inverse: $x = \frac{4y}{y-6}$

$x(y-6) = 4y$

$xy - 6x = 4y$

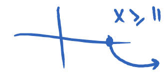
$xy - 4y = 6x$

$y(x-4) = 6x$

$y = \frac{6x}{x-4}$

$\therefore h^{-1}(x) = \frac{6x}{x-4}$, $x \neq 4$

4. $g(x) = -\sqrt{x - 11}$



$y = -\sqrt{x-11}$ ← original

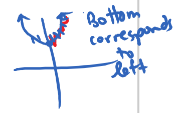
$x = -\sqrt{y-11}$ ← inverse

$-x = \sqrt{y-11}$

$(-x)^2 = y - 11$

$(-x)^2 + 11 = y$

$\therefore g^{-1}(x) = x^2 + 11$, $x \leq 0$



5. $f(x) = \sqrt[3]{2x - 4}$

orig: $y = \sqrt[3]{2x-4}$

inverse: $x = \sqrt[3]{2y-4}$

$x^3 = 2y - 4$

$x^3 + 4 = 2y$

$\frac{1}{2}(x^3 + 4) = y$

$\therefore f^{-1}(x) = \frac{1}{2}x^3 + 2$

6. $j(x) = \dfrac{7}{x - 11}$

orig: $y = \frac{7}{x-11}$

inverse: $x = \frac{7}{y-11}$

$x(y-11) = 7$

$xy - 11x = 7$

$xy = 7 + 11x$

$\therefore j^{-1}(x) = \frac{7+11x}{x}$, $x \neq 0$

7. $h(x) = \sqrt[4]{3x - 2}$

orig: $y = \sqrt[4]{3x-2}$

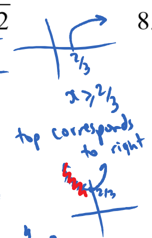
inverse: $x = \sqrt[4]{3y-2}$

$x^4 = 3y - 2$

$x^4 + 2 = 3y$

$\frac{1}{3}(x^4 + 2) = y$

$\therefore h^{-1}(x) = \frac{1}{3}x^4 + \frac{2}{3}$, $x \geq 0$



8. $j(x) = \sqrt{x - 2} + 5$

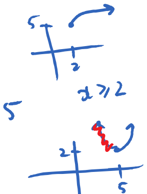
orig: $y = \sqrt{x-2} + 5$

inverse: $x = \sqrt{y-2} + 5$

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

$(x-5)^2 = y - 2$

$(x-5)^2 + 2 = j^{-1}(x)$, $x \geq 5$



9. $f(x) = -x^2 + 6$, when $x \geq 0$

orig: $y = -x^2 + 6$

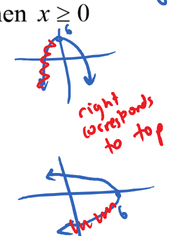
inverse: $x = -y^2 + 6$

$x - 6 = -y^2$

$-x + 6 = y^2$

$\pm\sqrt{-x+6} = y$

$\therefore f^{-1}(x) = +\sqrt{-x+6}$, $x \leq 6$



10. $g(x) = x^4 - 8$, when $x \leq 0$

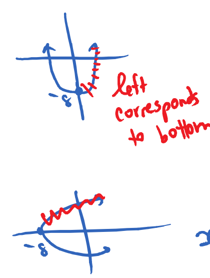
orig: $y = x^4 - 8$

inverse: $x = y^4 - 8$

$x + 8 = y^4$

$\pm\sqrt[4]{x+8} = y$

$\therefore g^{-1}(x) = -\sqrt[4]{x+8}$



$x \geq -8$

11. $h(x) = (x - 1)^2$, when $x \geq 1$

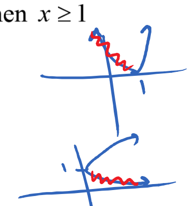
orig: $y = (x-1)^2$

inverse: $x = (y-1)^2$

$\pm\sqrt{x} = y - 1$

$1 \pm \sqrt{x} = y$

$\therefore h^{-1}(x) = +\sqrt{x} + 1$, $x \geq 0$



12. $j(x) = (x + 4)^2 + 9$, when $x \leq -4$

orig: $y = (x+4)^2 + 9$

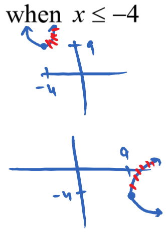
inverse: $x = (y+4)^2 + 9$

$x - 9 = (y+4)^2$

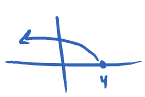
$\pm\sqrt{x-9} = y + 4$

$-4 \pm \sqrt{x-9} = y$

$\therefore j^{-1}(x) = -\sqrt{x-9} - 4$, $x \geq 9$



13. $f(x) = 3\sqrt{4 - x}$



$x \leq 4$

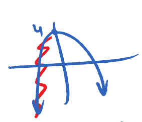
orig: $y = 3\sqrt{4-x}$

inverse: $x = 3\sqrt{4-y}$

$\frac{x}{3} = \sqrt{4-y}$

$\left(\frac{x}{3}\right)^2 = 4 - y$

$y = 4 - \left(\frac{x}{3}\right)^2$

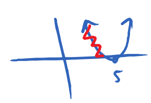


$\therefore f^{-1}(x) = -\frac{x^2}{9} + 4$, $x \geq 0$

14. $g(x) = x^2 - 10x + 25$, when $x \geq 5$

orig: $y = x^2 - 10x + 25$

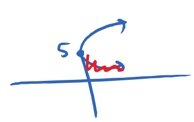
$y = (x-5)^2$ complete sq.



inverse: $x = (y-5)^2$

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

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



$\therefore g^{-1}(x) = +\sqrt{x} + 5$, $x \geq 0$

Practice Worksheet

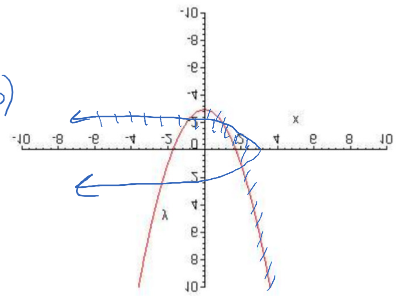
b) sketch inverse

c) restrict domain of original to ensure inverse is a function

~~For problems 15 – 20~~, a) identify whether the function is one-to-one.

13.

b)

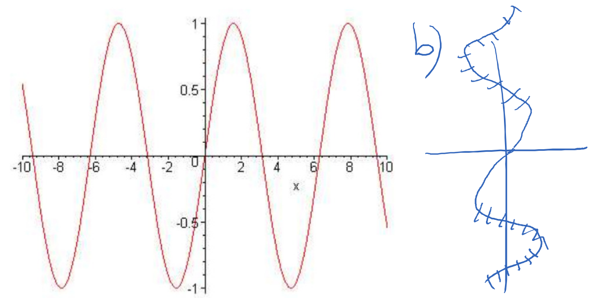


a) - not one to one

c) $x \leq 0$

14.

b)

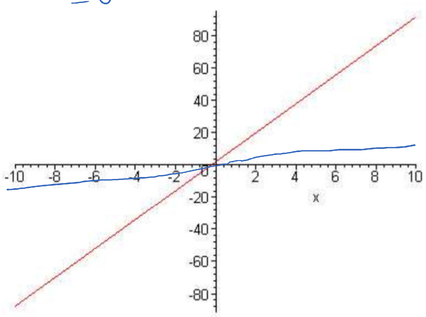


a) - not one to one

c) $-1.7 \leq x \leq 1.7$

15.

b)

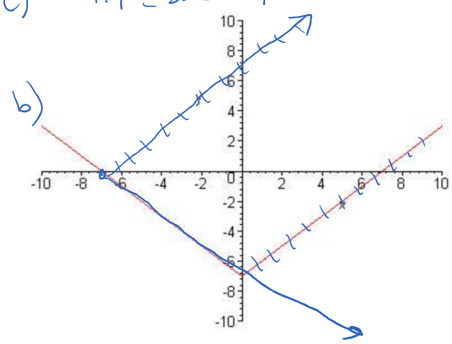


a) - one to one

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

16.

b)

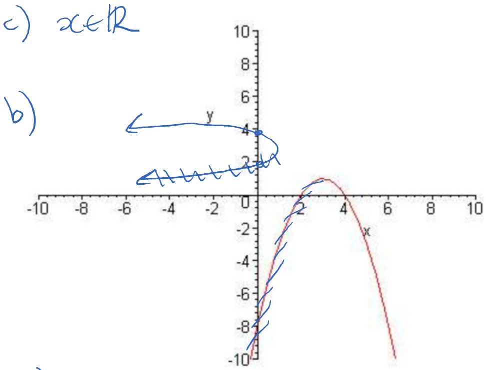


a) - not one to one

c) $x \leq 0$

17.

b)

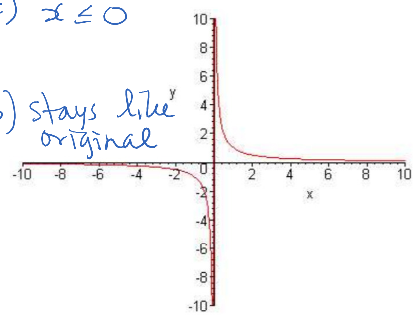


a) not one to one

c) $x \geq 3$

18.

b) stays like original



a) - one to one

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