ReviewSol

May 8, 2015 12:21 PM

1. a) domain $= \{-3, -1, 0, 4\}$, range $= \{0, 1, 5, 6\}$; not a function, because two y-values are assigned to $x = 0$

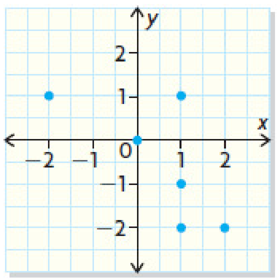
b) domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R}\}$; function, because each x-value has only one y-value assigned

c) domain $= \{x \in \mathbf{R} \mid x \geq -4\}$, range $= \{y \in \mathbf{R}\}$; not a function, because each $x > -4$ has two y-values assigned

d) domain $= \{x \in \mathbf{R} \mid -4 \leq x \leq 4\}$,
range $= \{y \in \mathbf{R} \mid -4 \leq y \leq 4\}$;
not a function, because each x except ± 4 has two y-values assigned

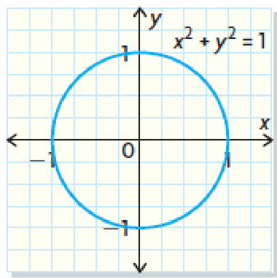
2. Vertical-line test

a)



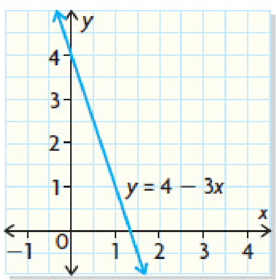
Not a function

d)



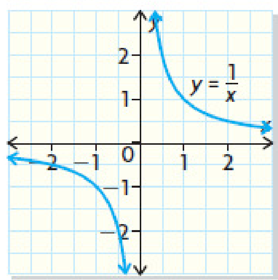
Not a function

b)



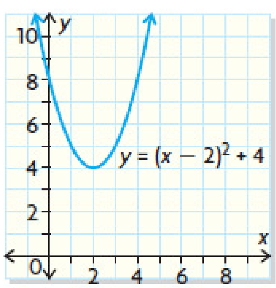
Function

e)



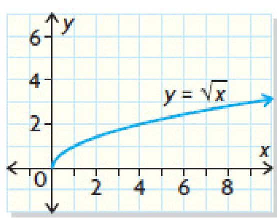
Function

c)



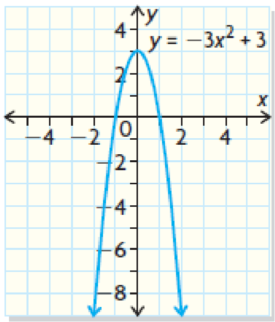
Function

f)



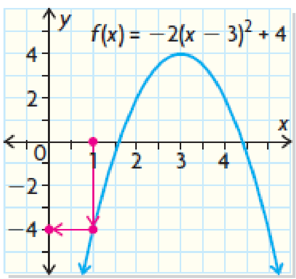
Function

3. Answers may vary; for example:



4. a) -7 d) $4b^2 + 6b - 5$
b) -5 e) $-8a - 1$
c) -2 f) 1 or -2

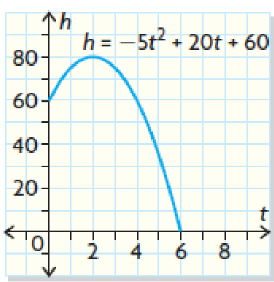
5. a), b)



a) domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \leq 4\}$
b) $f(1)$ represents the y-coordinate corresponding to $x = 1$.
c) i) 2 ii) -1 iii) $-2(-x - 2)^2 + 4$

6. 5, -1

7. a)

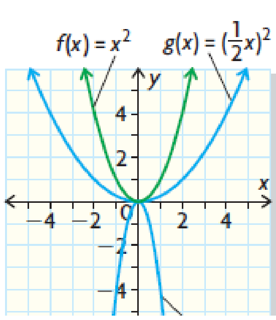


b) domain $= \{t \in \mathbf{R} \mid 0 \leq t \leq 6\}$,
range $= \{h \in \mathbf{R} \mid 0 \leq h \leq 80\}$
c) $h = -5t^2 + 20t + 60$

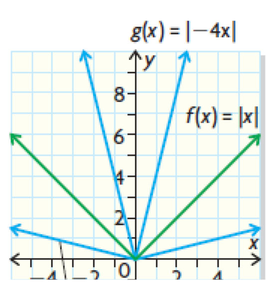
8. a) domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 3\}$
b) domain $= \{x \in \mathbf{R} \mid x \geq -2\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$

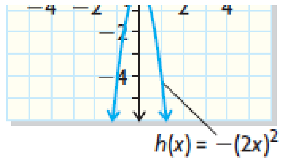
9. a) $y = \sqrt{4x}$
b) $y = \dfrac{1}{-\frac{1}{5}x}$

10. a)

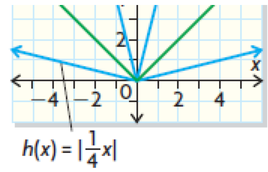


b)





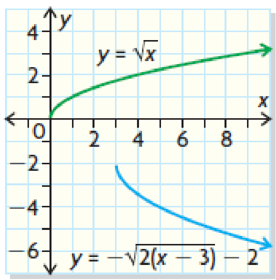
$f(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$;
$g(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$;
$h(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \leq 0\}$



$f(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$;
$g(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$;
$h(x)$: domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \geq 0\}$

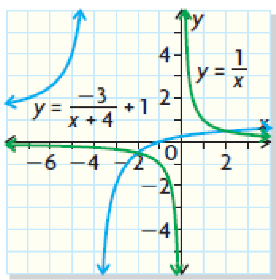
11. $\left(-\frac{5}{4}, 10\right)$

12. a) $y = -\sqrt{2(x-3)} - 2$



domain $= \{x \in \mathbf{R} \mid x \geq 3\}$, range $= \{y \in \mathbf{R} \mid y \leq -2\}$

b) $y = \dfrac{-3}{x+4} + 1$



domain $= \{x \in \mathbf{R} \mid x \neq -4\}$, range $= \{y \in \mathbf{R} \mid y \neq 1\}$

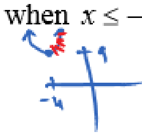
13. a) $4, -3$ b) $4, -3$ c) $-8, 6$ d) $-5, 2$

14. a) domain $= \{x \in \mathbf{R} \mid x \geqslant -4\}$, range $= \{y \in \mathbf{R} \mid y < -2\}$
b) domain $= \{x \in \mathbf{R} \mid x \leqslant 4\}$, range $= \{y \in \mathbf{R} \mid y < -1\}$
c) domain $= \{x \in \mathbf{R} \mid x \geqslant -5\}$, range $= \{y \in \mathbf{R} \mid y < 1\}$
d) domain $= \{x \in \mathbf{R} \mid x \leqslant 9\}$, range $= \{y \in \mathbf{R} \mid y > 3\}$

15. a) domain $= \{x \in \mathbf{R} \mid x \neq 2\}$, range $= \{y \in \mathbf{R} \mid y \neq 0\}$
b) domain $= \{x \in \mathbf{R} \mid x \leq 3\}$, range $= \{y \in \mathbf{R} \mid y \geq -4\}$
c) domain $= \{x \in \mathbf{R}\}$, range $= \{y \in \mathbf{R} \mid y \leq 3\}$

16.

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



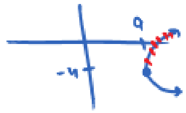
orig: $y = (x+4)^2 + 9$

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

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

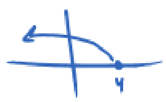
$\pm\sqrt{x-9} = y + 4$

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



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

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



$x \le 4$

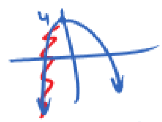
orig: $y = 3\sqrt{4-x}$

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

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

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

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



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

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

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

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

$x(y-6) = 4y$

$xy - 6x = 4y$

$xy - 4y = 6x$

$y(x-4) = 6x$

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

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

$x \neq 4$

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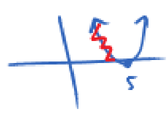
d) $g(x) = x^2 - 10x + 25$, when $x \geq 5$

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

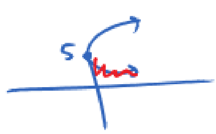
$y = (x-5)^2$ complete sq.



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

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

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



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