Name Key

Algebra 2

Period ___ Date ___

Ch. 6.7 – Inverses of Functions

Find the inverse of each relation. State whether the relation is a function. State whether the inverse is a function.

1. $\{(2,-3),(3,-4),(4,-2)\}$ Yes 2. $\{(-3,-6),(-1,2),(1,2),(3,6)\}$ yes 3. $\{(3,-2),(4,-1),(1,0),(3,1)\}$ NO

$\{(-3,2),(-4,3),(-2,4)\}$ yes $\{(-6,-3)\ (2,-1)\ (2,1)\ (6,3)\}$ NO $\{(-2,3)\ (-1,4)\ (0,1)\ (1,3)\}$ yes

Given the domain and range of a relation, state the domain and range of its inverse.

4. Relation: $D=\{x:x>0\}$, $R=\{y:y\le -3\}$

Inverse: $D=y\le -3$ $R=x>0$

5. Relation: $D=\{x:x\neq 5\}$, $R=\{y:y\neq 2\}$

Inverse: $D=y\neq 2$ $R=x\neq 5$

For each function, find an equation for the inverse, $f^{-1}(x)$. Is the inverse a function? [Hint: follow the 4 step process in your notes.]

6. $f(x)=-2x-7$

$y=-2x-7$

$x=-2y-7$

$x+7=-2y$

$y=\frac{x+7}{-2}$

$f^{-1}(x)=\frac{x+7}{-2}$

7. $f(x)=\frac{x+8}{3}$

$y=\frac{x+8}{3}$

$x=\frac{y+8}{3}$

$3x=y+8$

$y=3x-8$

$f^{-1}(x)=3x-8$

8. $f(x)=\frac{2}{3}x-5$

$y=\frac{2}{3}x-5$

$x=\frac{2}{3}y-5$

$x+5=\frac{2}{3}y$

$3x+15=2y$

$y=\frac{3x+15}{2}$

$f^{-1}(x)=\frac{3x+15}{2}$

9. $f(x)=\frac{1}{2}(x+2)-3$

$y=\frac{1}{2}x+1-3$

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

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

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

$2x+4=y$

$f^{-1}(x)=2x+4$

Use composition to verify that f and g are inverses. [Hint: show that $f(g(x))=x$ AND $g(f(x))=x$.] Label your work.

10. $f(x)=-2x-7$ and $g(x)=-\frac{1}{2}x-\frac{7}{2}$

$f(g(x))=f(-\frac{1}{2}x-\frac{7}{2})$

$-2(-\frac{1}{2}x-\frac{7}{2})-7$

$x+7-7$

x ✓

$g(f(x))=$

$g(-2x-7)=$

$-\frac{1}{2}(-2x-7)-\frac{7}{2}$

$x+7/2-7/2$

x ✓

11. $f(x)=\frac{x+8}{3}$ and $g(x)=3x-8$

$f(g(x))$

$f(3x-8)$

$\frac{3x-8+8}{3}$

$\frac{3x}{3}=x$ ✓

$g(f(x))$

$g(\frac{x+8}{3})$

$3(\frac{x+8}{3})-8$

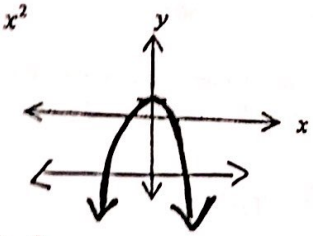
$x+8-8$

x ✓

Mixed Answers (1-3, 6-9): no, yes; yes, yes; yes, no; $f^{-1}(x)=3x-8$; $f^{-1}(x)=2x+4$; $f^{-1}(x)=\frac{3x+15}{2}$; $f^{-1}(x)=-\frac{1}{2}x-\frac{7}{2}$

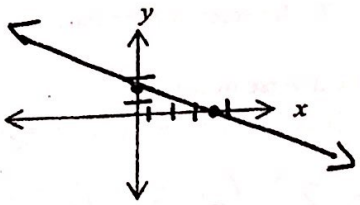
Use the HLT to determine whether the inverse is a function. Do NOT graph the inverse.

12. $f(x)=1-x^2$



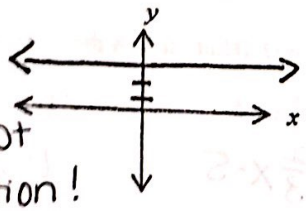
Not a function!

13. $g(x)=\frac{7-2x}{5}$



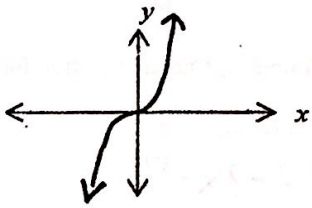
Is a function!

14. $g(x)=3$



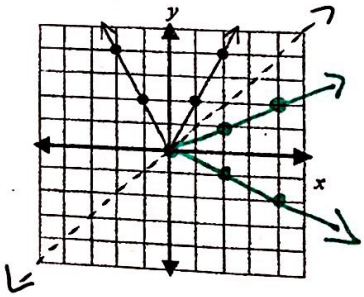
Is not a function!

15. $f(x)=x^5$



Is a function!

16. Given the graph at right.



a) State the domain and range.

D = $(-\infty, \infty)$

R = $[0, \infty)$

b) Is the relation a function? YES Explain using a complete sentence

Passes VLT

c) Sketch the inverse. Draw in the symmetry line (use color).

d) State the domain and range of the inverse.

D = $[0, \infty)$

R = $(-\infty, \infty)$

e) Is the inverse a function? NO Explain using a complete sentence.

Does not pass VLT.

Original does not pass HLT.

Mixed Answers: no; no; yes; yes; $\{x: x \geq 0\}$; $\{x: x \in \mathbb{R}\}$; $\{y: y \geq 0\}$; $\{y: y \in \mathbb{R}\}$; no; yes

$[0, \infty)$ $(-\infty, \infty)$ $[0, \infty)$ $(-\infty, \infty)$