Name: Answerkey

Homework:

Skills and Applications

Finding an Inverse Function Informally In Exercises 7–12, find the inverse function of f informally.

7. $f(x) = 6x$
8. $f(x) = \frac{1}{3}x$
9. $f(x) = 3x + 1$
10. $f(x) = \frac{x - 1}{5}$
11. $f(x) = \sqrt[3]{x}$
12. $f(x) = x^5$

Verifying Inverse Functions In Exercises 13–16, verify that f and g are inverse functions.

13. $f(x) = -\frac{7}{2}x - 3, \quad g(x) = -\frac{2x + 6}{7}$
14. $f(x) = \frac{x - 9}{4}, \quad g(x) = 4x + 9$
15. $f(x) = x^3 + 5, \quad g(x) = \sqrt[3]{x - 5}$
16. $f(x) = \frac{x^3}{2}, \quad g(x) = \sqrt[3]{2x}$

a) Is the inverse a function? b) Does f(x) pass the horizontal line test? c)

(7) a) $f(x) = 6x$ b) yes
$\frac{x}{6} = \frac{6y}{6}$ c) yes
$f^{-1}(x) = \frac{x}{6}$

(8) a) $f(x) = \frac{1}{3}x$
$\left(\frac{3}{1}\right)x = \frac{1}{3}y\left(\frac{3}{1}\right)$
$3x = y$ b) yes
$f^{-1}(x) = 3x$ c) yes

(9) a) $f(x) = 3x + 1$ b) yes
$\frac{x}{-1} = \frac{3y+1}{-1}$ c) yes
$\frac{x-1}{3} = \frac{3y}{3}$
$f^{-1}(x) = \frac{x-1}{3}$

(10) a) $f(x) = \frac{x-1}{5}$
$5 \cdot x = \frac{y-1}{5} \cdot 5$
$5x = y - 1$ b) yes
$+1 \quad +1$ c) yes
$5x + 1 = y$
$f^{-1}(x) = 5x + 1$

(11) a) $f(x) = \sqrt[3]{x}$ b) yes
$(x)^3 = (\sqrt[3]{y})^3$ c) yes
$x^3 = y$
$f^{-1}(x) = x^3$

(12) $f(x) = x^5$ a) no
$(x)^{1/5} = (y^5)^{1/5}$ c) no
$x^{1/5} = f^{-1}(x)$

(13) $f(g(x))$: $+\frac{7}{2}\left(\frac{-2x+6}{7}\right) - 3$
$\frac{2x+6}{2}$
$x + 3 - 3 = x$

$g(f(x))$: $\frac{-2\left(-\frac{7}{2}x - 3\right) + 6}{7}$
$= \frac{7x + 6 + 6}{7}$
$= \frac{7x + 12}{7}$
$= x + \frac{12}{7}$

not inverses both must equal x

Using a Table to Find an Inverse Function In Exercises 35 and 36, use the table of values for $y = f(x)$ to complete a table for $y = f^{-1}(x)$.

35.

x	−2	−1	0	1	2	3
$f(x)$	−2	0	2	4	6	8

36.

x	−3	−2	−1	0	1	2
$f(x)$	−10	−7	−4	−1	2	5

(35)

x	−2	0	2	4	6	8
$f^{-1}(x)$	−2	−1	0	1	2	3

(36)

x	−10	−7	−4	−1	2	5
$f^{-1}(x)$	−3	−2	−1	0	1	2

(14) $f(g(x))$

$f(x) = \frac{x-9}{4}$ $\quad g(x) = 4x+9$

$\frac{(4x+9)-9}{4} = \frac{4x}{4} = x$

$g(f(x))$

$4x+9$

$4\left(\frac{x-9}{4}\right)+9$

$x-9+9$

$= x$

yes - inverses

(15) $f(g(x))$

$f(x) = x^3+5$ $\quad g(x) = \sqrt[3]{x-5}$

x^3+5

$\left(\sqrt[3]{x-5}\right)^3+5$

$x-5+5$

$= x$

$g(f(x))$

$\sqrt[3]{x-5}$

$\sqrt[3]{(x^3+5)-5}$

$\sqrt[3]{x^3}$

$= x$

yes - inverses

(16) $f(g(x))$

$f(x) = \frac{x^3}{2}$ $\quad g(x) = \sqrt[3]{2x}$

$\frac{x^3}{2} = \frac{\left(\sqrt[3]{2x}\right)^3}{2} = \frac{2x}{2} = x$

$g(f(x))$

$\sqrt[3]{2x} = \sqrt[3]{2\left(\frac{x^3}{2}\right)}$

$\sqrt[3]{x^3} = x$

yes inverses