4.1 WS 2

KEY

Use the composition of functions to determine whether *f* and *g* are inverses of one another.

1. $f(x)=-2x+5;\ g(x)=\dfrac{x-5}{-2}$

$f(g(x))=-2\left(\frac{x-5}{-2}\right)+5$

$f(g(x))=x$

$g(f(x))=\dfrac{-2x+5-5}{-2}$

$g(f(x))=x$

yes

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

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

$f(g(x))=x$

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

$g(f(x))=x$

yes

3. $f(x)=\dfrac{2}{3}x-6;\ g(x)=\dfrac{3}{2}x+8$

$f(g(x))=\frac{2}{3}\left(\frac{3}{2}x+8\right)-6$

$f(g(x))=x+\frac{16}{3}-6$

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

No

4. $f(x)=\dfrac{4}{5}x+6;\ g(x)=\dfrac{5}{4}x-\dfrac{15}{2}$

$f(g(x))=\frac{4}{5}\left(\frac{5}{4}x-\frac{15}{2}\right)+6$

$f(g(x))=x-6+6$

$f(g(x))=x$

$g(f(x))=\frac{5}{4}\left(\frac{4}{5}x+6\right)-\frac{15}{2}$

$g(f(x))=x$

yes

Find the inverse function of the one-to-one function given.

5. $f(x)=\{(-2,1),(-1,4),(0,5),(2,9),(5,15)\}$

$f^{-1}(x)=\{(1,-2),(4,-1),(5,0),(9,2),(15,5)\}$

6. $g(x)=\{(-2,30),(-1,11),(0,4),(1,3),(2,2)\}$

$g^{-1}(x)=\{(30,-2),(11,-1),(4,0),(3,1),(2,2)\}$

Find the inverse of each function, then state the domain and range of $f^{-1}(x)$.

7. $f(x)=3x-5$

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

$f^{-1}(x)=\frac{1}{3}x+\frac{5}{3}$

D_x of $f^{-1}(x)=(-\infty,\infty)$

R_y of $f^{-1}(x)=(-\infty,\infty)$

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

$2y+5=x$

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

D_x of $f^{-1}(x)=(-\infty,\infty)$

R_y of $f^{-1}(x)=(-\infty,\infty)$

9. $f(x)=x^3+3$

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

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

D_x of $f^{-1}(x)=(-\infty,\infty)$

R_y of $f^{-1}(x)=(-\infty,\infty)$

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

$yx+3y=2x-1$

$3y+1=2x-yx$

$3y+1=x(2-y)$

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

D_x of $f^{-1}(x)=(-\infty,2)\cup(2,\infty)$

R_y of $f^{-1}(x)=(-\infty,-3)\cup(-3,\infty)$

11. The function $s(x)=2x+24$ can be used to convert a U.S. women's shoes size into an Italian women's shoe size. Determine the function $s^{-1}(x)$ that can be used to convert an Italian women's shoe size to it equivalent U.S. shoe size.

$S^{-1}(x)=\frac{1}{2}x-12$

12. A clothing merchant uses the function $S(x)=\frac{3}{2}x+18$ to determine the retail selling price S, in dollars, of a winter coat for which she has paid a wholesale price of x dollars.

a. The merchant paid a wholesale price of \$96 for a winter coat. Use S to determine the retail selling price she will charge for this coat.

$S(x)=\frac{3}{2}(96)+18$

$S(x)=\$162$

b. Find S^{-1} and use it to determine the merchant's wholesale price for a coat that retails at \$399.

$y=\frac{3}{2}x+18$

$y-18=\frac{3}{2}x$

$\frac{2}{3}y-12=x$

$S^{-1}(x)=\frac{2}{3}x-12$

$S^{-1}(x)=\$254$