

Function Operations and Composition of Functions Assignment

Using $f(x)$ and $g(x)$ find $(f + g)(x)$. Determine the domain of each new function.

1. $f(x) = 7x + 1$
 $g(x) = 2x - 9$

2. $f(x) = 2x^3 + 1$
 $g(x) = 2x^2 - 1$

3. $f(x) = \sqrt{x + 1}$
 $g(x) = \sqrt{x - 4}$

4. $f(x) = \frac{7x}{2}$
 $g(x) = \frac{x}{6}$

Using $f(x)$ and $g(x)$ find $(f - g)(x)$. Determine the domain of each new function.

5. $f(x) = 5x$
 $g(x) = 2x - 10$

6. $f(x) = x^2 + 3x - 2$
 $g(x) = 3x^2 + 2x - 1$

7. $f(x) = 4 - \frac{1}{x}$
 $g(x) = 7 + \frac{1}{x}$

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

Function Operations and Composition of Functions AssignmentUsing $f(x)$ and $g(x)$ find $(f * g)(x)$. Determine the domain of each new function.

9.
$$\begin{aligned} f(x) &= 6x \\ g(x) &= 4x - 1 \end{aligned}$$

10.
$$\begin{aligned} f(x) &= 5x^2 + 2x \\ g(x) &= x^3 - 4x - 1 \end{aligned}$$

11.
$$\begin{aligned} f(x) &= \sqrt{x + 1} \\ g(x) &= 2\sqrt{x - 1} \end{aligned}$$

12.
$$\begin{aligned} f(x) &= \frac{x + 2}{2} \\ g(x) &= \frac{x - 1}{3} \end{aligned}$$

Using $f(x)$ and $g(x)$ find $\left(\frac{f}{g}\right)(x)$. Determine the domain of each new function.

13.
$$\begin{aligned} f(x) &= 4x - 1 \\ g(x) &= x - 4 \end{aligned}$$

14.
$$\begin{aligned} f(x) &= 2x^2 + x - 3 \\ g(x) &= x - 3 \end{aligned}$$

15.
$$\begin{aligned} f(x) &= x^2 - 36 \\ g(x) &= x - 6 \end{aligned}$$

16.
$$\begin{aligned} f(x) &= \frac{x + 1}{2} \\ g(x) &= \frac{x - 1}{3} \end{aligned}$$

Function Operations and Composition of Functions Assignment

Find each composite function. Determine the domain of each composite function.

17. $f(x) = x + 2$ $g(x) = x - 4$
 $(f \circ g)(x) = ?$ $D_{f \circ g} = ?$

18. $f(x) = \sqrt{x - 1}$ $g(x) = x^2 + 3$
 $(g \circ f)(x) = ?$ $D_{g \circ f} = ?$

19. $f(x) = \frac{1}{x + 1}$ $g(x) = \frac{4}{x}$
 $(f \circ g)(x) = ?$ $D_{f \circ g} = ?$

20. $f(x) = \frac{x^2}{3}$ $g(x) = x - 6$
 $(g \circ f)(x) = ?$ $D_{g \circ f} = ?$

Find and then evaluate each composite function.

21. $f(x) = 7 - x$ $g(x) = x^2 - 2x - 2$
 $(f \circ g)(1) = ?$

22. $f(x) = \frac{3}{x}$ $g(x) = \frac{x}{2}$
 $(g \circ f)(3) = ?$

Function Operations and Composition of Functions Assignment

23. $f(x) = 1 - 2x$ $g(x) = \sqrt{x + 1}$
 $(f \circ g)(-1) = ?$

24. $f(x) = \frac{x - 4}{2}$ $g(x) = \frac{2x}{3}$
 $(g \circ f)(-2) = ?$

Express $h(x)$ as a composition of two functions f and $(f \circ g)(x)$.

25. $h(x) = \sqrt[3]{x^3 - 23}$

26. $h(x) = |4x - 21|$

27. $h(x) = \frac{3}{2x + 4}$

28. $h(x) = (x^2 - 3x)^6$

Function Operations and Composition of Functions Assignment**ANSWERS**Using $f(x)$ and $g(x)$ find $(f + g)(x)$. Determine the domain of each new function.

$$\begin{aligned}
 1. \quad f(x) &= 7x + 1 \\
 g(x) &= 2x - 9 \\
 (f + g)(x) &= (7x + 1) + (2x - 9) \\
 (f + g)(x) &= \mathbf{9x - 8} \\
 D_{f+g} &= \mathbf{(-\infty, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad f(x) &= 2x^3 + 1 \\
 g(x) &= 2x^2 - 1 \\
 (f + g)(x) &= (2x^3 + 1) + (2x^2 - 1) \\
 (f + g)(x) &= \mathbf{2x^3 + 2x^2} \\
 D_{f+g} &= \mathbf{(-\infty, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad f(x) &= \sqrt{x+1} \\
 g(x) &= \sqrt{x-4} \\
 \\ \\
 (f + g)(x) &= \mathbf{(\sqrt{x+1}) + (\sqrt{x-4})} \\
 D_{f+g} &= D_f \cap D_g \\
 D_f &= [-1, \infty) \\
 D_g &= [4, \infty) \\
 D_{f+g} &= [-1, \infty) \cap [4, \infty) \\
 D_{f+g} &= \mathbf{[4, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad f(x) &= \frac{7x}{2} \\
 g(x) &= \frac{x}{6} \\
 \\ \\
 (f + g)(x) &= \left(\frac{7x}{2}\right) + \left(\frac{x}{6}\right) \\
 (f + g)(x) &= \frac{22x}{6} = \mathbf{\frac{11x}{3}} \\
 D_{f+g} &= \mathbf{(-\infty, \infty)}
 \end{aligned}$$

Using $f(x)$ and $g(x)$ find $(f - g)(x)$. Determine the domain of each new function.

$$\begin{aligned}
 5. \quad f(x) &= 5x \\
 g(x) &= 2x - 10 \\
 (f - g)(x) &= (5x) - (2x - 10) \\
 (f - g)(x) &= \mathbf{3x + 10} \\
 \\ \\
 D_{f-g} &= \mathbf{(-\infty, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad f(x) &= x^2 + 3x - 2 \\
 g(x) &= 3x^2 + 2x - 1 \\
 (f - g)(x) &= (x^2 + 3x - 2) - (3x^2 + 2x - 1) \\
 (f - g)(x) &= \mathbf{-2x^2 + x - 1} \\
 \\ \\
 D_{f-g} &= \mathbf{(-\infty, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 7. \quad f(x) &= 4 - \frac{1}{x} \\
 g(x) &= 7 + \frac{1}{x} \\
 \\ \\
 (f - g)(x) &= \left(4 - \frac{1}{x}\right) - \left(7 + \frac{1}{x}\right) \\
 (f - g)(x) &= 4 - \frac{1}{x} - 7 - \frac{1}{x} \\
 (f - g)(x) &= \mathbf{-3 - \frac{2}{x}}
 \end{aligned}$$

$$\begin{aligned}
 8. \quad f(x) &= \frac{x}{2} \\
 g(x) &= \sqrt{x-3} \\
 \\ \\
 (f - g)(x) &= \left(\frac{x}{2}\right) - (\sqrt{x-3}) \\
 (f - g)(x) &= \mathbf{\frac{x - 2\sqrt{x-3}}{2}}
 \end{aligned}$$

$$\begin{aligned}
 D_{f-g} &= D_f \cap D_g \\
 D_f &= (-\infty, 0) \cup (0, \infty) \\
 D_g &= (-\infty, 0) \cup (0, \infty) \\
 D_{f-g} &= \mathbf{(-\infty, 0) \cup (0, \infty)}
 \end{aligned}$$

$$\begin{aligned}
 D_{f-g} &= D_f \cap D_g \\
 D_f &= (-\infty, \infty) \\
 D_g &= [3, \infty) \\
 D_{f-g} &= \mathbf{[3, \infty)}
 \end{aligned}$$

Function Operations and Composition of Functions AssignmentUsing $f(x)$ and $g(x)$ find $(f * g)(x)$. Determine the domain of each new function.

9. $f(x) = 6x$
 $g(x) = 4x - 1$
 $(f * g)(x) = (6x) * (4x - 1)$
 $(f * g)(x) = 24x^2 - 6x$

$$D_{f * g} = (-\infty, \infty)$$

11. $f(x) = \sqrt{x + 1}$
 $g(x) = 2\sqrt{x - 1}$

$$(f * g)(x) = (\sqrt{x + 1}) * (2\sqrt{x - 1})$$

$$(f * g)(x) = 2\sqrt{(x + 1)(x - 1)}$$

$$(f * g)(x) = 2\sqrt{x^2 - 1}$$

$$D_{f * g} = D_f \cap D_g$$

$$D_f = [-1, \infty)$$

$$D_g = [1, \infty)$$

$$D_{f * g} = [-1, \infty) \cap [1, \infty)$$

$$D_{f * g} = [1, \infty)$$

10. $f(x) = 5x^2 + 2x$
 $g(x) = x^3 - 4x - 1$
 $(f * g)(x) = (5x^2 + 2x) * (x^3 - 4x - 1)$
 $(f * g)(x) = 5x^5 + 2x^4 - 20x^3 - 13x^2 - 2x$

$$D_{f * g} = (-\infty, \infty)$$

12. $f(x) = \frac{x + 2}{2}$
 $g(x) = \frac{x - 1}{3}$
 $(f * g)(x) = \left(\frac{x + 2}{2}\right) * \left(\frac{x - 1}{3}\right)$
 $(f * g)(x) = \frac{x^2 - x + 2x - 2}{6}$
 $(f * g)(x) = \frac{x^2 + x - 2}{6}$

$$D_{f * g} = (-\infty, \infty)$$

Using $f(x)$ and $g(x)$ find $\left(\frac{f}{g}\right)(x)$. Determine the domain of each new function.

13. $f(x) = 4x - 1$
 $g(x) = x - 4$
 $\left(\frac{f}{g}\right)(x) = \frac{4x - 1}{x - 4}$

$$D_{\frac{f}{g}} = (-\infty, 4) \cup (4, \infty)$$

14. $f(x) = 2x^2 + x - 3$
 $g(x) = x - 3$
 $\left(\frac{f}{g}\right)(x) = \frac{2x^2 + x - 3}{x - 3}$

$$D_{\frac{f}{g}} = (-\infty, 3) \cup (3, \infty)$$

15. $f(x) = x^2 - 36$
 $g(x) = x - 6$

$$\left(\frac{f}{g}\right)(x) = \frac{x^2 - 36}{x - 6} = \frac{(x + 6)(x - 6)}{x - 6}$$

$$\left(\frac{f}{g}\right)(x) = x + 6$$

$$D_{\frac{f}{g}} = (-\infty, 6) \cup (6, \infty)$$

16. $f(x) = \frac{x + 1}{2}$
 $g(x) = \frac{x - 1}{3}$
 $\left(\frac{f}{g}\right)(x) = \frac{\frac{x + 1}{2}}{\frac{x - 1}{3}} =$
 $\left(\frac{f}{g}\right)(x) = \frac{3(x + 1)}{2(x - 1)}$
 $D_{\frac{f}{g}} = (-\infty, 1) \cup (1, \infty)$

Function Operations and Composition of Functions Assignment

Find each composite function. Determine the domain of each composite function.

$$17. \quad f(x) = x + 2 \quad g(x) = x - 4$$

$$(f \circ g)(x) = ? \quad D_{f \circ g} = ?$$

$$(f \circ g)(x) = f(g(x))$$

$$f(g(x)) = (g(x)) + 2$$

$$f(g(x)) = (x - 4) + 2$$

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

$$D_{f \circ g} = \mathbf{(-\infty, \infty)}$$

$$19. \quad f(x) = \frac{1}{x+1} \quad g(x) = \frac{4}{x}$$

$$(f \circ g)(x) = ? \quad D_{f \circ g} = ?$$

$$(f \circ g)(x) = f(g(x))$$

$$f(g(x)) = \frac{1}{g(x)+1} \quad \frac{4}{x} \neq 0 \quad x \neq 0$$

$$f(g(x)) = \frac{1}{\frac{4}{x}+1} \quad \frac{4}{x} + 1 \neq 0 \quad x \neq -4$$

$$f(g(x)) = \frac{\mathbf{x}}{\mathbf{4+x}}$$

$$D_g = (-\infty, 0) \cup (0, \infty)$$

$$D_{f \circ g} = \mathbf{(-\infty, -4) \cup (-4, 0) \cup (0, \infty)}$$

$$18. \quad f(x) = \sqrt{x-1} \quad g(x) = x^2 + 3$$

$$(g \circ f)(x) = ? \quad D_{g \circ f} = ?$$

$$(g \circ f)(x) = g(f(x))$$

$$g(f(x)) = (f(x))^2 + 3$$

$$g(f(x)) = (\sqrt{x-1})^2 + 3 \quad x-1 \geq 0 \quad x \geq 1$$

$$g(f(x)) = x - 1 + 3$$

$$g(f(x)) = \mathbf{x + 2}$$

$$D_f = [1, \infty)$$

$$D_{g \circ f} = \mathbf{[1, \infty)}$$

$$20. \quad f(x) = \frac{x^2}{3} \quad g(x) = x - 6$$

$$(g \circ f)(x) = ? \quad D_{g \circ f} = ?$$

$$(g \circ f)(x) = g(f(x))$$

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

$$g(f(x)) = \frac{x^2}{3} - 6$$

$$g(f(x)) = \frac{\mathbf{x^2 - 18}}{\mathbf{3}}$$

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

$$D_{g \circ f} = \mathbf{(-\infty, \infty)}$$

Find and then evaluate each composite function.

$$21. \quad f(x) = 7 - x \quad g(x) = x^2 - 2x - 2$$

$$(f \circ g)(1) = ?$$

$$(f \circ g)(x) = f(g(x))$$

$$f(g(x)) = 7 - g(x)$$

$$f(g(x)) = 7 - (x^2 - 2x - 2)$$

$$f(g(x)) = \mathbf{-x^2 + 2x + 9}$$

$$f(g(1)) = -1^2 + 2 * 1 + 9$$

$$f(g(1)) = \mathbf{10}$$

$$22. \quad f(x) = \frac{3}{x} \quad g(x) = \frac{x}{2}$$

$$(g \circ f)(3) = ?$$

$$(g \circ f)(x) = g(f(x))$$

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

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

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

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

$$g(f(3)) = \frac{\mathbf{1}}{\mathbf{2}}$$

Function Operations and Composition of Functions Assignment

23. $f(x) = 1 - 2x$ $g(x) = \sqrt{x+1}$
 $(f \circ g)(-1) = ?$

$$(f \circ g)(x) = f(g(x))$$

$$f(g(x)) = 1 - 2 * g(x)$$

$$f(g(x)) = 1 - 2 * \sqrt{x+1}$$

$$f(g(x)) = \mathbf{1 - 2\sqrt{x+1}}$$

$$f(g(-1)) = 1 - 2\sqrt{-1+1}$$

$$f(g(-1)) = \mathbf{1}$$

24. $f(x) = \frac{x-4}{2}$ $g(x) = \frac{2x}{3}$

$$(g \circ f)(-2) = ?$$

$$(g \circ f)(x) = g(f(x))$$

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

$$g(f(x)) = \frac{2 * \frac{x-4}{2}}{3}$$

$$g(f(x)) = \frac{\mathbf{x-4}}{3}$$

$$g(f(-2)) = \frac{-2-4}{3} = \frac{-6}{3}$$

$$g(f(-2)) = \mathbf{-2}$$

Express $h(x)$ as a composition of two functions f and $(f \circ g)(x)$.

25. $h(x) = \sqrt[3]{x^3 - 23}$

$$h(x) = \sqrt[3]{x^3 - 23}$$

$$h(x) = (f \circ g)(x) = f(g(x))$$

$$f(g(x)) = \sqrt[3]{g(x)} = \sqrt[3]{x^3 - 23}$$

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

$$g(x) = x^3 - 23$$

26. $h(x) = |4x - 21|$

$$h(x) = |4x - 21|$$

$$h(x) = (f \circ g)(x) = f(g(x))$$

$$f(g(x)) = |g(x)| = |4x - 21|$$

$$f(x) = |x|$$

$$g(x) = \mathbf{4x - 21}$$

27. $h(x) = \frac{3}{2x+4}$

$$h(x) = \frac{3}{2x+4}$$

$$h(x) = (f \circ g)(x) = f(g(x))$$

$$f(g(x)) = \frac{3}{g(x)+4} = \frac{3}{2x+4}$$

$$f(x) = \frac{3}{x+4} \quad g(x) = \mathbf{2x}$$

28. $h(x) = (x^2 - 3x)^6$

$$h(x) = (x^2 - 3x)^6$$

$$h(x) = (f \circ g)(x) = f(g(x))$$

$$f(g(x)) = (g(x))^6 = (x^2 - 3x)^6$$

$$f(x) = \mathbf{x^6} \quad g(x) = \mathbf{x^2 - 3x}$$