

For the six functions below, state the domain in interval notation. Use the functions to perform the operations indicated in the problems that follow.

$$f(x) = -3$$

$$\text{Domain: } (-\infty, +\infty)$$

$$k(x) = 4x + 8$$

$$\text{Domain: } (-\infty, +\infty)$$

$$g(x) = 4$$

$$\text{Domain: } (-\infty, +\infty)$$

$$c(x) = x^2$$

$$\text{Domain: } (-\infty, +\infty)$$

$$h(x) = 6x - 9$$

$$\text{Domain: } (-\infty, +\infty)$$

$$m(x) = x^2 + 2x$$

$$\text{Domain: } (-\infty, +\infty)$$

Perform the indicated operation using the functions above. State the new domain in interval notation when requested.

$$1. f(x) + h(x)$$

$$(-3) + (6x - 9)$$

$$6x - 12$$

$$\text{Domain: } (-\infty, +\infty)$$

$$2. h(x) + k(x)$$

$$(6x - 9) + (4x + 8)$$

$$10x - 1$$

$$3. k(x) + m(x)$$

$$(4x + 8) + (x^2 + 2x)$$

$$x^2 + 6x + 8$$

$$4. k(x) - f(x)$$

$$(4x + 8) - (-3)$$

$$4x + 11$$

$$\text{Domain: } (-\infty, +\infty)$$

$$5. k(x) - h(x)$$

$$(4x + 8) - (6x - 9)$$

$$4x + 8 - 6x + 9$$

$$-2x + 17$$

$$6. c(x) - m(x)$$

$$(x^2) - (x^2 + 2x)$$

$$x^2 - x^2 - 2x$$

$$-2x$$

$$7. m(x) - k(x) + h(x)$$

$$(x^2 + 2x) - (4x + 8) + (6x - 9)$$

$$x^2 + 2x - 4x - 8 + 6x - 9$$

$$x^2 + 4x - 17$$

$$\text{Domain: } (-\infty, +\infty)$$

$$8. c(x) - m(x) + h(x) - f(x)$$

$$(x^2) - (x^2 + 2x) + (6x - 9) - (-3)$$

$$x^2 - x^2 - 2x + 6x - 9 + 3$$

$$4x - 6$$

$$9. f(x) \cdot k(x)$$

$$(-3)(4x + 8)$$

$$-12x - 24$$

$$\text{Domain: } (-\infty, +\infty)$$

$$10. h(x) \cdot k(x)$$

$$(6x - 9)(4x + 8)$$

$$12. f(x) \cdot k(x) \cdot c(x)$$

$$(-3)(4x + 8)(x^2)$$

$$-12x^3 - 24x^2$$

$$24x^2 + 12x - 72$$

$$\text{Domain: } (-\infty, +\infty)$$

$$x^4 + 2x^3$$

13. $\frac{f(x)}{g(x)}$

$$\frac{-3}{4}$$

Domain: $(-\infty, +\infty)$

14. $\frac{k(x)}{g(x)}$

$$\frac{4x+8}{4}$$

$x+2$

15. $\frac{f(x)}{h(x)}$

$$\frac{-3}{6x-9} = \frac{-1}{2x-3}$$

$$\frac{-1}{2x-3}$$

Domain: $(-\infty, \frac{3}{2}) \cup (\frac{3}{2}, +\infty)$

16. $\frac{m(x)}{c(x)}$

$$\frac{x^2+2x}{x^2}$$

$$\frac{x+2}{x}$$

Domain: $(-\infty, 0) \cup (0, +\infty)$

17. $\frac{c(x)}{m(x)}$

$$\frac{x^2}{x^2+2x}$$

$$\frac{x}{x+2}$$

Domain: $(-\infty, -2) \cup (-2, 0) \cup (0, +\infty)$

18. Evaluate $h(x) = 6x - 9$ when $x = -2$ and when $x = \frac{1}{2}$.

$h(-2) = -21$

$h(\frac{1}{2}) = -6$

19. Evaluate $m(x) = x^2 + 2x$ when $x = 4$ and when $x = -5$.

$m(4) = 24$

$m(-5) = 15$

20. Evaluate $j(x) = x^3 - 3x^2 + 2x - 5$ when $x = 3$ and when $x = -3$.

$j(3) = 1$

$j(-3) = -65$

21. A small company sells photo printers online. The company's total monthly revenue (R) and costs (C) are modeled by the functions $R(x) = 120x$ and $C(x) = 2500 + 75x$, where x is the number of printers sold. Find $R(x) - C(x)$. Explain what this difference means.

$$(120x) - (2500 + 75x)$$

$$45x - 2500$$

profit