

$$33. f(x) = \frac{6x}{x-3} \text{ and } g(x) = \frac{3x}{x+2}$$

$$34. f(x) = \frac{4x}{x+1} \text{ and } g(x) = \frac{2x}{x-2}$$

For each pair of functions f and g given, determine the sum, difference, product, and quotient of f and g , then determine the domain in each case.

$$35. f(x) = 2x + 3 \text{ and } g(x) = x - 2$$

$$36. f(x) = x - 5 \text{ and } g(x) = 2x - 3$$

$$37. f(x) = x^2 + 7 \text{ and } g(x) = 3x - 2$$

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$$38. f(x) = x^2 - 3x \text{ and } g(x) = x + 4$$

$$39. f(x) = x^2 + 2x - 3 \text{ and } g(x) = x - 1$$

$$40. f(x) = x^2 - 2x - 15 \text{ and } g(x) = x + 3$$

$$41. f(x) = 3x + 1 \text{ and } g(x) = \sqrt{x-3}$$

$$42. f(x) = x + 2 \text{ and } g(x) = \sqrt{x+6}$$

$$43. f(x) = 2x^2 \text{ and } g(x) = \sqrt{x+1}$$

$$44. f(x) = x^2 + 2 \text{ and } g(x) = \sqrt{x-5}$$

$$45. f(x) = \frac{2}{x-3} \text{ and } g(x) = \frac{5}{x+2}$$

$$46. f(x) = \frac{4}{x-3} \text{ and } g(x) = \frac{1}{x+5}$$

$$47. \text{ Given } f(x) = x^2 - 5x - 14, \text{ find } f(-2), f(7), f(2a), \text{ and } f(a-2)$$

$$48. \text{ Given } g(x) = x^3 - 9x, \text{ find } g(-3), g(2), g(3t), \text{ and } g(t+1)$$

For each pair of functions below, find (a) $h(x) = (f \circ g)(x)$ and (b) $H(x) = (g \circ f)(x)$, and (c) determine the domain of each result.

$$49. f(x) = \sqrt{x+3} \text{ and } g(x) = 2x - 5$$

Compose two functions and determine the domain; decompose a function

$$50. f(x) = x + 3 \text{ and } g(x) = \sqrt{9-x^2}$$

$$51. f(x) = \sqrt{x-3} \text{ and } g(x) = 3x + 4$$

52. $f(x) = \sqrt{x+5}$ and $g(x) = 4x - 1$

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

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

55. $f(x) = x^2 + x - 4$ and $g(x) = x + 3$

56. $f(x) = x^2 - 4x + 2$ and $g(x) = x - 2$

57. $f(x) = |x| - 5$ and $g(x) = -3x + 1$

58. $f(x) = |x - 2|$ and $g(x) = 3x - 5$

For the functions $f(x)$ and $g(x)$ given, analyze the domain of (a) $(f \circ g)(x)$ and (b) $(g \circ f)(x)$, then (c) find the actual compositions and comment.

59. $f(x) = \frac{2x}{x+3}$ and $g(x) = \frac{5}{x}$

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

61. $f(x) = \frac{4}{x}$ and $g(x) = \frac{1}{x-5}$

62. $f(x) = \frac{3}{x}$ and $g(x) = \frac{1}{x-2}$

63. For $f(x) = x^2 - 8$, $g(x) = x + 2$, and $h(x) = (f \circ g)(x)$, find $h(5)$ in two ways

1. $(f \circ g)(5)$

2. $f[g(5)]$

64. For $p(x) = x^2 - 8$, $q(x) = x + 2$, and $H(x) = (p \circ q)(x)$, find $H(-2)$ in two ways

1. $(p \circ q)(-2)$

2. $p[q(-2)]$

65. For $h(x) = (\sqrt{x-2} + 1)^3 - 5$, find two functions f and g such that $(f \circ g)(x) = h(x)$

66. For $H(x) = \sqrt[3]{x^2 - 5} + 2$, find two functions p and q such that $(p \circ q)(x) = h(x)$

67. Given $f(x) = 2x - 1$, $g(x) = x^2 - 1$, and $h(x) = x + 4$, find $p(x) = f[g([h(x))]]$ and $q(x) = g[f([h(x))]]$