

# FUNCTIONS - OPERATIONS

- 1) Let  $f(x) = 3x + 7$  and  $g(x) = 2x^2$ . Perform the function operation and then find the domain of the result.

$(f + g)(x)$  add the two functions:  $3x + 7 + 2x^2$

$2x^2 + 3x + 7$  Domain: all reals

- 2) Let  $f(x) = x - 3$  and  $g(x) = 5x^2$ . Perform the function operation and then find the domain of the result.

$(f - g)(x)$  subtract the  $g(x)$

$x - 3 - 5x^2$  Put in order highest exponent first

$-5x^2 + x - 3$  Domain: all reals

- 3) Let  $f(x) = 2x^2 + 5x - 7$  and  $g(x) = x - 1$ . Perform the function operation and then find the domain.

$(f + g)(x)$  add the two functions:  $2x^2 + 5x - 7 + x - 1$

combine like terms and put in order  $2x^2 + 6x - 8$  Domain: all reals

- 4) Let  $f(x) = 3x^2 - 9x + 6$  and  $g(x) = x - 2$ . Perform the function operation and then find the domain of the result.

$(f \cdot g)(x)$  multiply the two functions:  $(3x^2 - 9x + 6)(x - 2)$

combine like terms and put in order  $3x^3 - 9x^2 + 6x - 6x^2 + 18x - 12$

$3x^3 - 15x^2 + 24x - 12$  Domain: all reals

- 5) Let  $f(x) = 3x + 5$  and  $g(x) = x^2 - x + 3$ . Perform the function operation and then find the domain.

$f(x) + g(x)$  add the two functions:  $3x + 5 + x^2 - x + 3$  combine like terms and put in order

$x^2 + 2x + 8$  Domain: all reals

- 6) Let  $f(x) = 5x + 2$  and  $g(x) = x^2 - x + 1$ . Perform the function operation and then find the domain.

$g(x) - f(x)$  subtract the right from the left function:  $x^2 - x + 1 - (5x + 2)$

combine like terms and put in order  $x^2 - x + 1 - 5x - 2$

$x^2 - 6x - 1$  Domain: all reals

- 7) Let  $f(x) = 4x + 3$  and  $g(x) = x^2 - 6x + 5$ . Perform the function operation and then find the domain.

$f(x) \cdot g(x)$  multiply the two functions:  $(4x + 3)(3x^2 - 9x + 6)$   
 $12x^3 - 36x^2 + 24x + 9x^2 - 27x + 18$   
 $12x^3 - 27x^2 - 3x + 18$  Domain: all reals

- 8) Let  $f(x) = 5x + 2$  and  $g(x) = x^2 - 6x + 5$ . Perform the function operation and then find the domain.

$\frac{f(x)}{g(x)}$  divide the two functions \* $g(x)$  on the bottom, do not simplify  
 $\frac{5x+2}{x^2-6x+5}$  **\*\*DOMAIN: CAN'T HAVE A ZERO IN DENOMINATOR**  
 Factor the bottom  $(x-5)(x-1)$  **DOMAIN: all reals except  $x=5$  and  $x=1$**

- 9) Let  $f(x) = 3x + 2$  and  $g(x) = x^2 - 5x + 4$ . Perform the function operation and then find the domain.

$\frac{f(x)}{g(x)}$  divide the two functions \* $g(x)$  on the bottom, do not simplify  
 $\frac{3x+2}{x^2-5x+4}$  **\*\*DOMAIN: CAN'T HAVE A ZERO IN DENOMINATOR**  
 Factor the bottom  $(x-4)(x-1)$  **DOMAIN: all reals except  $x=4$  and  $x=1$**

- 10) Let  $f(x) = x - 9$  and  $g(x) = 3x^2$ . Perform the function operation and then find the domain of the result.

$(f + g)(x)$   
 add the two functions:  $x - 9 + 3x^2$  combine like terms and put in order  
 $3x^2 + x - 9$  Domain: all reals

- 11) Let  $f(x) = x - 6$  and  $g(x) = x^2$ . Perform the function operation and then find the domain of the result.

$(f - g)(x)$   
 subtract the left from the right function:  $x - 6 - x^2$   
 Put in order highest exponent first  $-x^2 + x - 6$  Domain: all reals

- 12) Let  $f(x) = x^2 + 2x - 3$  and  $g(x) = x - 1$ . Perform the function operation and then find the domain.

$(f + g)(x)$  add the two functions:  $x^2 + 2x - 3 + x - 1$  combine like terms and put in order  
 $x^2 + 3x - 4$  Domain: all reals

- 13) Let  $f(x) = 3x^2 + 12x - 15$  and  $g(x) = x + 5$ . Perform the function operation and then find the domain of the result.

$(f \cdot g)(x)$  multiply the two functions:  $(x + 5)(3x^2 + 12x - 15)$   
 $3x^3 + \underline{12x^2} - 15x + \underline{5x^2} + 60x - 75$   
 $3x^3 + 17x^2 + 45x - 75$  Domain: all reals

- 14) Let  $f(x) = 4x + 3$  and  $g(x) = x^2 - x + 4$ . Perform the function operation and then find the domain.

$f(x) + g(x)$  add the two functions:  $x^2 - x + 4 + 4x + 3$  combine like terms and put in order  
 $x^2 + 3x + 7$  Domain: all reals

- 15) Let  $f(x) = 5x + 4$  and  $g(x) = x^2 - x + 3$ . Perform the function operation and then find the domain.

$g(x) - f(x)$  subtract the left from the right function:  $x^2 - x + 3 - (5x + 4)$   
 combine like terms and put in order  $x^2 - x + 3 - 5x - 4$   
 $x^2 - 6x - 1$  Domain: all reals

- 16) Let  $f(x) = 3x + 2$  and  $g(x) = x^2 - 9x + 20$ . Perform the function operation and then find the domain.

$f(x) \cdot g(x)$  multiply the two functions:  $(3x + 2)(x^2 - 9x + 20)$   
 $3x^3 - \underline{27x^2} + 60x + \underline{2x^2} - 18x + 40$   
 $3x^3 - 25x^2 + 42x + 40$  Domain: all reals

- 17) Let  $f(x) = 5x + 4$  and  $g(x) = x^2 - 6x + 5$ . Perform the function operation and then find the domain.

$f(x) \cdot g(x)$  multiply the two functions:  $(5x + 4)(x^2 - 6x + 5)$   
 $5x^3 - \underline{30x^2} + 25x + \underline{4x^2} - 24x + 20$   
 $5x^3 - 26x^2 + x + 20$  Domain: all reals

- 18) Let  $f(x) = 5x + 4$  and  $g(x) = x^2 - 8x + 15$ . Perform the function operation and then find the domain.

divide the two functions \* $g(x)$  on the bottom, do not simplify  
 $\frac{f(x)}{g(x)} = \frac{5x+4}{x^2-8x+15}$  \*\*DOMAIN: CAN'T HAVE A ZERO IN DENOMINATOR

Factor the bottom  $(x-5)(x-3)$  DOMAIN: all reals except  $x=5$  and  $x=3$

- 19) Let  $f(x) = 2x + 5$  and  $g(x) = x^2 - 3x + 2$ . Perform the function operation and then find the domain.

divide the two functions  $\frac{f(x)}{g(x)}$  on the bottom, do not simplify

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

$$\frac{2x+5}{x^2-3x+2}$$

**\*\*DOMAIN: CAN'T HAVE A ZERO IN DENOMINATOR**

Factor the bottom  $(x-2)(x-1)$  **DOMAIN: all reals except  $x=2$  and  $x=1$**

- 20) Find **a.**  $(f + g)(x)$  **b.**  $(f + g)(6)$ .

$$f(x) = 5x + 3, g(x) = 5x - 6 \text{ add the two functions: } 5x + 3 + 5x - 6$$

combine like terms and put in order  $10x - 3$

$$\text{plug 6 in for } x: 10(6) - 3 = 57 \text{ Domain: all reals}$$

- 21) If  $f(x) = x - 8$  and  $g(x) = 4x^2$ , find  $(f + g)(x)$  and  $(f + g)(4)$ .

add the two functions:  $x - 8 + 4x^2$  put in order  $4x^2 + x - 8$

$$\text{plug 4 in for } x: 4(4)^2 + (4) - 8 = 54 \text{ Domain: all reals}$$

- 22) Find **a.**  $(f + g)(x)$  **b.**  $(f + g)(7)$ .

$$f(x) = 2x^2 - x - 2, g(x) = x - 3 \text{ add the two functions: } 2x^2 - x - 2 + x - 3$$

combine like terms  $2x^2 - 5$

$$\text{plug 7 in for } x: 2(7)^2 - 5 = 93 \text{ Domain: all reals}$$

- 23) Let  $f(x) = 5x$  and  $g(x) = -2x - 6$ . Find  $(f + g)(x)$ ,  $(f - g)(x)$ ,  $(fg)(x)$ , and  $\left(\frac{f}{g}\right)(x)$ .

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$$(f + g)(x) = 3x - 6 \text{ (Simplify your answer.) } \quad 5x - 2x - 6$$

$$(f - g)(x) = 7x + 6 \text{ (Simplify your answer.) } \quad 5x - (-2x - 6) = 5x + 2x + 6$$

$$(fg)(x) = -10x^2 - 30x \text{ (Simplify your answer.) } \quad 5x(-2x - 6)$$

$$\left(\frac{f}{g}\right)(x) = \frac{5x}{-2x - 6} \text{ (Simplify your answer.)}$$

24)  $f(x) = x^2 - 5x$  and  $g(x) = 2 - x$

Find  $(f+g)(x)$  and  $(f+g)(7)$ .

add the two functions:  $4x^2 - 5x + 2 - x$

combine like terms  $4x^2 - 6x + 2$

plug 7 in for x:  $4(7)^2 - 6(7) + 2 = 156$

Domain: all reals

25) Let  $f(x) = x^2 - 5x$  and  $g(x) = 7 + x$ . Find  $f(2) + g(2)$ .

$$(2)^2 - 5(2) + 7 + (2)$$

$$-6 + 9 = 3$$

26)  $f(x) = x^2 + 6x$  and  $g(x) = 1 - x$

Find  $(f-g)(x)$  and  $(f-g)(3)$ .

subtract the left from the right function:  $x^2 + 6x - (1 - x)$

combine like terms  $x^2 + 5x + 1$

plug 4 in for x:  $4(4)^2 + (4) - 8 = 54$

Domain: all reals

27) Let  $f(x) = x^2 - 4x$  and  $g(x) = 7 + x$ . Find  $f(-1) - g(-1)$ .

$$(-1)^2 - 4(-1) - (7 + (-1))$$

$$5 - 6 = -1$$

28) Find **a.**  $(f+g)(x)$  **b.**  $(f+g)(8)$ .

$f(x) = 5x + 4$ ,  $g(x) = 4x + 3$

add the two functions:  $5x + 4 + 4x + 3$

combine like terms  $9x + 7$

plug 8 in for x:  $9(8) + 7 = 79$

Domain: all reals