

## Combining Functions

1) If  $f(x) = \sqrt{x}$  and  $g(x) = \sqrt{9-x^2}$ , then the **domain** of the function  $\left(\frac{f}{g}\right)(x)$ , in interval notation, is

A)  $[0, 3)$

B)  $(-3, 0)$

C)  $(-3, 3)$

D)  $[0, 3]$

E)  $(-3, 0]$

2) If  $f(x) = 1 - 3x$  and  $(f \circ g)(x) = 3x^3 - x^2 + 2$ , then  $g(-1) =$

A) 1

B) -1

C)  $\frac{5}{3}$

D) -4

E) 4

3) Which one of the following is TRUE for the functions  $f(x) = 3x + 2$  and  $g(x) = (1/3)x - 2/3$ ?

(a)  $(f - g)(-1) = 0$

(b)  $(f \cdot g)(1) = 5$

(c)  $(g + f)(3) = 35/3$

(d)  $(g \circ f)(2) \neq (f \circ g)(2)$

(e)  $(f/g)(0)$  is undefined

4) If  $f(x) = \sqrt{16-x^2}$  and  $g(x) = x^2 - 7x + 12$ , then the domain of the function  $f/g$  is

- (a)  $[-4, 3) \cup (3, 4]$
- (b)  $[-4, 3) \cup (3, 4]$
- (c)  $[-4, -3] \cup (-3, 4)$
- (d)  $[-4, 4]$
- (e)  $(-\infty, -4] \cup [4, \infty)$

5) If  $f(x) = 2x^2 + 5$ ,  $g(x) = 2x + m$  and the graph of the function  $(f \circ g)(x)$  has y-intercept 23, then  $m =$

- (a)  $\pm 3$
- (b)  $\pm 7$
- (c)  $\pm\sqrt{7}$
- (d)  $-5$
- (e)  $5$

6) If  $g(x) = 4x - 5$  and  $(g \circ f)(x) = 8x^2 + 12x - 1$ , then  $f(-2)$  is equal to:

- (a) 3
- (b) 7
- (c) 15
- (d)  $-7$
- (e)  $-13$

7) If  $f(x) = \begin{cases} 2x-1 & \text{if } x \leq -1 \\ 2x+3 & \text{if } x > -1 \end{cases}$  and  $g(x) = \llbracket x \rrbracket$ , where  $\llbracket \cdot \rrbracket$  is the greatest integer function, then the value of  $(f \circ g)(-0.3) + \sqrt{(f \cdot g)(0.5)}$  is equal to

- (a) -3
- (b) -4
- (c) -1
- (d) -2
- (e) 1

8) Let  $\llbracket \cdot \rrbracket$  denote the greatest integer function and let  $f(x) =$

$$\begin{cases} \left(\frac{1}{5}\right) (\llbracket x \rrbracket - 1) & \text{if } x \leq -1 \\ 1 - \llbracket x \rrbracket & \text{if } x > -1 \end{cases}, \quad (f \circ f)\left(-\frac{3}{2}\right) =$$

- (a) 2
- (b) 0.2
- (c) 0.36
- (d) -2
- (e) 0

9) If  $f(x) = \sqrt{16 + \sqrt{x}}$ , then  $(f \circ f)(0)$  is equal to

- (a) 9
- (b)  $2\sqrt{3}$
- (c)  $3\sqrt{2}$
- (d) 8
- (e) 4

10) If  $f(x) = \begin{cases} 2x-1 & \text{if } x \leq -1 \\ 2x+3 & \text{if } x > -1 \end{cases}$ , and  $g(x) = \llbracket x \rrbracket$ , where  $\llbracket \cdot \rrbracket$  is the greatest integer function, then  $(f \circ g)(-0.3) + \sqrt{(f \cdot g)(0.5)}$  is equal to

- (a) -2
- (b) -4
- (c) -1
- (d) -3
- (e) 1

- 11) If  $f(x) = 2x - 1$  and  $(f \circ g)(x) = 2x + 1$ , then  $g(x)$  is equal to
- (a)  $-2$
  - (b)  $2x + 2$
  - (c)  $2$
  - (d)  $x + 2$
  - (e)  $x + 1$
- 12) If  $f(x) = \frac{x-1}{3-x}$  and  $g(x) = \sqrt{x+2}$ , then the domain of  $(f \circ g)(x)$  is
- (a)  $[-2, 7) \cup (7, \infty)$
  - (b)  $(3, \infty)$
  - (c)  $[-2, \infty)$
  - (d)  $[-2, 3)$
  - (e)  $[-2, 3) \cup (3, \infty)$
- 13) Let  $f(x) = x^2 - 2x$  and  $g(x) = \frac{1}{x+3}$ .  
If  $(f \circ g)(k) = 0$ , then  $k$  is equal to
- (a)  $-\frac{2}{5}$
  - (b)  $2$
  - (c)  $-\frac{1}{2}$
  - (d)  $-2$
  - (e)  $-\frac{5}{2}$

14) If  $f(x) = x^3$  and  $g(x) = |x - 1|$ , then  $\left(\frac{f}{g}\right)(\sqrt{2})$  is equal to

- (a)  $2 + 2\sqrt{2}$
- (b)  $4 + 2\sqrt{2}$
- (c)  $2 + \sqrt{2}$
- (d)  $4 - 2\sqrt{2}$
- (e)  $2\sqrt{2} - 2$

15) If  $(f \circ g)(x) = 10 - x$ , and  $f(x) = 2x + 4$  and  $g(x) = ax + b$ , where  $a, b$  are real numbers, then  $a, b$  are equal to

- (a)  $-\frac{1}{2}, 3$
- (b)  $-\frac{1}{2}, 7$
- (c)  $-2, 3$
- (d)  $\frac{1}{2}, -3$
- (e)  $-1, 10$

16) The domain of  $(g \circ f)(x)$ , where  $f(x) = \frac{2}{x}$  and  $g(x) = \sqrt{x - 3}$  is

- (a)  $(0, \frac{2}{3}]$
- (b)  $(-\infty, 0) \cup [\frac{2}{3}, \infty)$
- (c)  $(-\infty, \infty)$
- (d)  $(-\infty, 0) \cup (0, \infty)$
- (e)  $[0, \frac{2}{3}]$

- 17) Given that  $(g \circ f)(k) = 1$ , where  $f(x) = x + 1$  and  $g(x) = 2 - x^2$ , then the set of all possible values of  $k$  is equal to

- (a)  $\{-2, 0\}$
- (b)  $\{-2, -1, 0, 1, 2\}$
- (c)  $\{0\}$
- (d)  $\{-2, 0, 2\}$
- (e)  $\{0, 2\}$

- 18) Let  $[x]$  denote the greatest integer function and let

$$f(x) = \begin{cases} \frac{1}{5}([x] - 1) & \text{if } x \leq -1 \\ 1 - [x] & \text{if } x > -1 \end{cases}, \text{ then the value of } (f \circ f)\left(-\frac{3}{2}\right) \text{ is equal to}$$

- (a) 0.2
- (b) 0.36
- (c) 2
- (d) -0.2
- (e) 0

- 19) If  $f(x) = \begin{cases} \lceil x - 1 \rceil & \text{if } x > -2 \\ |x| & \text{if } -4 \leq x \leq -2 \\ -3 & \text{if } x < -4 \end{cases}$ , where  $\lceil \quad \rceil$  denotes the greatest integer function, then  $(f \circ f)\left(-\frac{3}{2}\right) + f(-5) =$

- (A) 0
- B) -4
- C) 3
- D) -2
- E) 4

20) If  $f(x) = \sqrt{x+1}$  and  $g(x) = x^2 + 2x$ , then the **domain** of  $\frac{f}{g}$  is

- (A)  $[-1, 0) \cup (0, \infty)$
- (B)  $(-2, -1] \cup [1, \infty)$
- (C)  $[-1, 0)$
- (D)  $(-2, -1] \cup (0, \infty)$
- (E)  $[-1, \infty)$

21) If  $(g \circ f)(x) = -2x^2 + 4|x| + 3$  and  $g(x) = -2x + 3$ , then  $f(-1) =$

- (A)  $-1$
- (B)  $2$
- (C)  $1$
- (D)  $-2$
- (E)  $0$