2.7: 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) ± 3

B) $\pm\sqrt{7}$

C) -5

D) 5

E) ± 7

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 $g(x) = [\![x]\!]$, where $[\![\cdot]\!]$ 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. 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

9. 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) $x + 1$

10. 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) $[-2,3) \cup (3,\infty)$

11. 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) $-\frac{5}{2}$

12. 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) $2\sqrt{2} - 2$

13.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) $-1,10$

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

A) $\left(0, \frac{2}{3}\right]$

B) $(-\infty, 0) \cup \left[\frac{2}{3}, \infty\right)$

C) $(-\infty, \infty)$

D) $(-\infty, 0) \cup (0, \infty)$

E) $\left[0, \frac{2}{3}\right]$

15. 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) $\{0,2\}$

16. Let $[\![x]\!]$ denote the greatest integer function and let $f(x) = \begin{cases} \frac{1}{5}([\![x]\!] - 1) & \text{if } x \leq -1 \\ 1 - [\![x]\!] & \text{if } x > -1 \end{cases}$, then the value of $(f \circ f)\left(-\frac{3}{2}\right)$ is equal to

A) 0.2

B) 0.36

C) 2

D) -0.2

E) 0

17.If f(x)=$\begin{cases} [\![x-1]\!] & if \quad x>-2 \\ |x| & if \quad -4 \le x \le -2 \\ -3 & if \quad x<-4 \end{cases}$, where $[\![\cdot]\!]$ 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

18. 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) $[-1,\infty)$

19.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

20.If $f(x) = \frac{x}{x+1}$ and $g(x) = \frac{x-2}{2x+4}$, then the domain of the function $\frac{f}{g}$ is

A) $(-\infty, \infty)$

B) $(-\infty, 2) \cup (2, \infty)$

C) $(-\infty, -1) \cup (-1,2) \cup (2, \infty)$

D) $(-\infty, -2) \cup (-2, -1) \cup (-1,2) \cup (2, \infty)$

E) $(-\infty, 1) \cup (1,2) \cup (2, \infty)$

21. If $f(x) = -x^2 + 3x + 1$ and $g(x) = [\![x - 3]\!]$, then $(f \circ g)(2\pi) =$

A) 17

B) -17

C) 13

D) 1

E) 19

22. Given the function $f(x) = \begin{cases} [\![x + 1]\!] & \text{if} \quad x \geq 0 \\ |x| - 1 & \text{if} \quad x < 0 \end{cases}$, where $[\![\cdot]\!]$ denotes the greatest integer function, then $(f \circ f)(-\pi) =$

A) 3

23.If $f(x) = \sqrt[4]{x+1}, g(x) = x^3 + 2x^2 + x$ and the domain of $\frac{f}{g}$ is $(a, b) \cup (b, \infty)$, then $a + b =$

A) -1

24.If $(f \circ g)(x) = x^2 + \frac{1}{x^2} - 4$ and $g(x) = x - \frac{1}{x}$, then $f(3) =$

A) 7