

# Comprehensive Functions Drill

The answers can be found in Part IV.

1. If  $x \diamond y = x^2y + 2xy - y$ , then  $3 \diamond 1.5 =$

- (A) 1.503
- (B) 203
- (C) 302
- (D) 0021
- (E) 2100

3. If  $f(x) = \frac{x^2 + 3}{2}$  and  $g(x) = \sqrt[3]{x}$  then

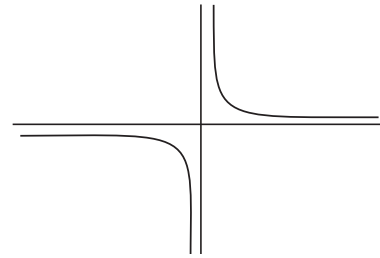
$f(g(2.7)) =$

- (A) 1.392
- (B) 1.726
- (C) 2.469
- (D) 4.392
- (E) 5.145

5. If  $g(x) = \frac{\sqrt[3]{x^2 - 2x + 3}}{\sqrt{x - 3}}$ , then what is the domain

of  $g(x)$ ?

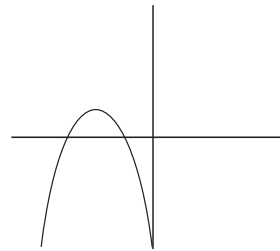
- (A)  $\{x: x \neq 3\}$
- (B)  $\{x: x \neq -3\}$
- (C)  $\{x: x \geq 3\}$
- (D)  $\{x: x \leq 3\}$
- (E)  $\{x: x > 3\}$



11. Which of the following are true about the function shown above?

- I. The function is even.
- II. The function is odd
- III. The function is symmetrical across the line  $y = -x$ .

- (A) I only
- (B) II only
- (C) III only
- (D) I and III only
- (E) II and III only



18. If the graph of  $f(x)$  is shown above, and  $g(x) = x^2$ , then which of the following equations represents  $f(x)$ ?

- (A)  $f(x) = g(x + 3)^2 + 2$
- (B)  $f(x) = g(x - 3)^2 + 2$
- (C)  $f(x) = -g(x + 3)^2 - 2$
- (D)  $f(x) = -g(x + 3)^2 + 2$
- (E)  $f(x) = -g(x - 3)^2 + 2$

27. Which of the following functions has a vertical asymptote at  $x = 3$ ?

(A)  $f(x) = \frac{3x^2 + 4x}{x^2 + 9}$

(B)  $f(x) = x^2 + 6x + 12$

(C)  $f(x) = \frac{3x^2 + 4}{x^2 - 9}$

(D)  $f(x) = \frac{x}{3x^3 + 2x - 4}$

(E)  $f(x) = 2x - 6$

$$f(x) = \begin{cases} x^2 - 3 & \text{if } x < -1 \\ e^x & \text{if } -1 \leq x \leq 1 \\ \ln x & \text{if } x > 1 \end{cases}$$

28. What is the value of  $f(f(f(-2)))$ ?

(A)  $-2.718$

(B)  $-2$

(C)  $-1$

(D)  $1$

(E)  $2.718$

32. If  $f(x) = \frac{2}{x^2}$ , then what is  $f^{-1}(x)$ ?

(A)  $\frac{\sqrt{2x}}{x}$

(B)  $\frac{2}{x^2}$

(C)  $\frac{\sqrt{x}}{2}$

(D)  $\frac{2}{x}$

(E)  $\frac{\sqrt{2}}{x}$

44. If  $g(x) = x^2 - 1$  and  $f(g(x)) = 2x^2$ , then  $f(x) =$

(A)  $2x + 1$

(B)  $2x + 2$

(C)  $x\sqrt{2} + 1$

(D)  $2x^2 - 1$

(E)  $2x^2 - \frac{1}{2}$

45. If function  $f(x)$  is periodic, then which of the following functions is NOT periodic?

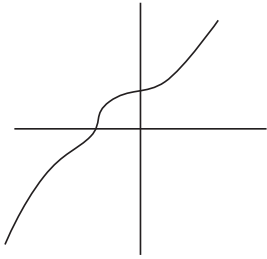
(A)  $|-f(x)|$

(B)  $f(x + 2) + 2$

(C)  $3f(x - 2)$

(D)  $xf(x)$

(E)  $\frac{1}{f(x)}$



49. The graph of  $f(x)$  is show above. If  $f(g(x)) = x$ , then which of the following could be the graph of  $g(x)$ ?

