The Discriminant

Multiple Choice

1. $3x^2 + 23x - 13 = 0$

How many distinct real solutions does the given equation have?

A. Exactly one
B. Exactly two
C. Exactly three
D. Zero
E. Infinitely many

2. If the quadratic equation $x^2 - kx + 25 = 0$ has one real solution, which of the following is a possible value of k?

A. -15
B. -5
C. 0
D. 10
E. 15

3. Which of the following most accurately describes the number of roots of $3x^2 + 3x + 1 = 0$?

A. Exactly one
B. Exactly two
C. Exactly three
D. Zero
E. Infinitely many

4.
$$y = x^2$$
$$px + qy = -z$$

In the above system of equations, p, q, and z are integers. For which of the following will there be more than one real solution for the system?

A. $p^2 + 4qz > 0$
B. $q^2 - 4pz < 0$
C. $p^2 - 4qz > 0$
D. $q^2 + 4pz < 0$
E. $q^2 + 4pz = 0$

5. For what values of c does the equation $x^2 + cx + 4 = 0$ have no real solutions?

A. All $c < 0$
B. All $c < 4$
C. $-4 < c < 0$
D. $0 < c < 4$
E. $-4 < c < 4$

6. How many real solutions does the equation $-4x^2 - x + 3 = 0$ have?

A. Exactly one
B. Exactly two
C. Exactly three
D. Zero
E. Infinitely many

7. $$4x^2 + bx + 169 = 0$$

In the given equation, b is a positive integer. The equation has one real solution. What is the value of b?

A. 0
B. 4
C. 13
D. 52
E. 169

8. $$-x^2 + 5x + k = 0$$

In the given equation, k is a constant. One of the solutions can be written as $\frac{1}{2}(5 - \sqrt{53})$. What is the value of k?

A. -7
B. 0
C. 5
D. 7
E. 53

9. If the quadratic equation $-9x^2 + kx - 441 = 0$ has one real solution, what is the value of k, where k is a positive integer?

A. 9
B. 21
C. 49
D. 126
E. 441

10. $-x^2 + bx - 625 = 0$

In the given equation, b is a positive integer. The equation has no real solutions. What is the greatest possible value of b?

A. 25
B. 48
C. 49
D. 50
E. 625