Advanced High School Algebraic Mastery

Mathematics · Practice Test · 10 Questions

1. Which of the following describes the behavior of a polynomial function f(x) = ax^n + ... as x approaches infinity if a < 0 and n is an even integer?

A) f(x) approaches infinity
B) f(x) approaches negative infinity
C) f(x) approaches 0
D) f(x) oscillates indefinitely

2. Given the system of equations 2x + y - z = 3, x - y + 2z = 4, and 3x - 2z = 1, what is the value of x?

A) 1
B) 2
C) 3
D) 4

3. What is the discriminant of the quadratic equation 3x^2 - 5x + 4 = 0?

A) -23
B) 7
C) 23
D) 49

4. According to the Remainder Theorem, what is the remainder when the polynomial P(x) = x^3 - 2x^2 + x - 5 is divided by (x - 3)?

A) 3
B) 7
C) 10
D) 13

5. For the function f(x) = log_b(x), which condition must be satisfied for the function to be defined as a real-valued function?

A) x > 0, b > 0, b != 1
B) x >= 0, b > 0
C) x != 0, b > 1
D) x > 0, b != 0

6. Which expression is equivalent to the simplified form of (i^10 + i^20) where i is the imaginary unit?

A) 0
B) 1
C) 2i
D) -2

7. What are the vertical asymptotes of the rational function f(x) = (x^2 - 4) / (x^2 - x - 6)?

A) x = 3
B) x = -2
C) x = 2, x = -3
D) x = 3, x = -2

8. If log_2(x) + log_2(x - 2) = 3, what is the valid solution for x?

A) 4
B) -2
C) 4 and -2
D) None of these

9. What is the expansion of (x + y)^5 using the Binomial Theorem?

A) x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5
B) x^5 + x^4y + x^3y^2 + x^2y^3 + xy^4 + y^5
C) x^5 + 5x^4y + 5x^3y^2 + 5x^2y^3 + 5xy^4 + y^5
D) x^5 + 10x^4y + 10x^3y^2 + 10x^2y^3 + 10xy^4 + y^5

10. For a geometric series with first term a=2 and common ratio r=0.5, what is the sum to infinity?

A) 1
B) 2
C) 4
D) 8