Essential Pre-Calculus Mastery

Mathematics · Practice Test · 10 Questions

1. What is the range of the principal branch of the inverse secant function, arcsec(x)?

A) [0, ?], x != ?/2
B) (-?/2, ?/2), x != 0
C) [0, ?/2) ? (?/2, ?]
D) (-?, 0) ? (0, ?)

2. Which value represents the exact numerical limit of (1 + 1/n)^n as n approaches infinity?

A) The square root of 2
B) The golden ratio (?)
C) Euler's number (e)
D) The natural logarithm of 10

3. For a conic section defined by $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$, what condition must be met for the curve to be a hyperbola?

A) $B^2 - 4AC = 0$
B) $B^2 - 4AC < 0$
C) $B^2 - 4AC > 0$
D) A = C and B = 0

4. What is the period of the function f(x) = tan(bx) where b > 0?

A) 2?/b
B) ?/b
C) 1/b
D) ?

5. According to the Rational Root Theorem, if P(x) = a_nx^n + ... + a_0 has a rational root p/q, what must be true about q?

A) q must be a factor of the leading coefficient a_n
B) q must be a factor of the constant term a_0
C) q must be prime
D) q must equal a_n

6. What are the horizontal and vertical asymptotes of the function f(x) = (x^2 - 1) / (x^2 - 4)?

A) y=1, x=±2
B) y=0, x=±1
C) y=1, x=±1
D) y=0, x=±2

7. Which trigonometric identity correctly represents the double-angle formula for cosine in terms of sine only?

A) cos(2?) = 1 - 2sin²(?)
B) cos(2?) = 2sin²(?) - 1
C) cos(2?) = 1 + sin²(?)
D) cos(2?) = sin²(?) - 1

8. If a sequence is defined by a_n = a_1 * r^(n-1), what is the formula for the sum of the first n terms when r != 1?

A) S_n = a_1(1-r^n) / (1-r)
B) S_n = a_1(1-r^n) / (1+r)
C) S_n = n/2 * (a_1 + a_n)
D) S_n = a_1 / (1-r)

9. What is the magnitude of the complex number z = 3 - 4i?

A) 1
B) 5
C) 7
D) 25

10. Which property must a function f(x) possess for its inverse function f?¹(x) to exist?

A) It must be periodic
B) It must be even
C) It must be one-to-one (injective)
D) It must be discontinuous