Question Paper - maths

Difficulty: Medium Time: 14

Q1. Determine the derivative of the function f(x) = 4x^3 - 7x^2 + 2x - 5 with respect to x.

A) A) 12x^2 - 14x + 2

B) B) 12x^2 - 7x + 2

C) C) 4x^2 - 14x + 2

D) D) 12x^3 - 14x^2 + 2x

Q2. Given the function g(x) = (x^2 + 3)(e^x), find g'(x).

A) A) 2xe^x

B) B) (x^2 + 2x + 3)e^x

C) C) (x^2 + 3)e^x + 2x

D) D) (2x + 3)e^x

Q3. Calculate the derivative of h(x) = (sin(x)) / (x^2 + 1).

A) A) (cos(x)(x^2 + 1) - 2x sin(x)) / (x^2 + 1)^2

B) B) (sin(x)(x^2 + 1) - 2x cos(x)) / (x^2 + 1)^2

C) C) (cos(x)(x^2 + 1) + 2x sin(x)) / (x^2 + 1)^2

D) D) (2x sin(x) - cos(x)(x^2 + 1)) / (x^2 + 1)^2

Q4. Find the derivative of k(x) = cos(4x^2 - 3x).

A) A) -sin(4x^2 - 3x)

B) B) (8x - 3)sin(4x^2 - 3x)

C) C) -(8x - 3)sin(4x^2 - 3x)

D) D) sin(4x^2 - 3x)

Q5. Determine the derivative of m(x) = ln(tan(x)).

A) A) sec^2(x) / tan(x)

B) B) cot(x) sec^2(x)

C) C) 1 / tan(x)

D) D) -cot(x) sec^2(x)

Q6. Given the equation x^2y + y^3 = 10, find dy/dx using implicit differentiation.

A) A) -2xy / (x^2 + 3y^2)

B) B) (2xy + 3y^2) / x^2

C) C) -2xy / (x^2 + y^2)

D) D) (2xy + 3y^2) / (x^2 + 3y^2)

Q7. If f(x) = x^4 - 5x^3 + 2x - 1, calculate the second derivative, f''(x).

A) A) 4x^3 - 15x^2 + 2

B) B) 12x^2 - 30x

C) C) 12x^2 - 15x

D) D) 4x^3 - 30x

Q8. Find the derivative of p(x) = arctan(2x).

A) A) 1 / (1 + 4x^2)
B) B) 2 / (1 + 4x^2)
C) C) 2 / (1 + x^2)
D) D) 1 / (1 + (2x)^2)

Q9. A spherical balloon is being inflated. If its volume is increasing at a rate of 10 cm^3/s, how fast is its ra

A) A) 1 / (10π) cm/s
B) B) 1 / (4π) cm/s
C) C) 1 / (20π) cm/s
D) D) 1 / (50π) cm/s

Q10. For a function f(x) that is differentiable at x=a, which of the following statements is true regarding the

A) A) The slope of the tangent line is given by f(a).
B) B) The equation of the tangent line is y - f(a) = f'(a)(x - a).
C) C) The tangent line always intersects the x-axis at x=a.
D) D) The tangent line is always horizontal if f'(a) exists.