計算題（每題 10 分，共 100 分）

1. Find \( \frac{dy}{dx} \) given that \( x \sin y - y \sin x = 0 \)

2. Find \( \lim_{x \to 0} \frac{1 - \cos x}{x} \).

3. Let \( f(x) = \frac{c}{x} + x^2 \). Determine all values of the constant \( c \) such that \( f \) has a relative minimum, but no relative maximum.

4. Find \( \int \frac{2x}{(x+1)^2} \, dx \).

5. Find \( \int \frac{dx}{\sqrt{e^{2x} - 1}} \).

6. Evaluate \( \lim_{x \to \infty} \left( 1 + \frac{1}{x} \right)^x \).

7. Which points on the graph of \( y = 4 - x^2 \) are closest to the point \( (0,2) \).

8. Suppose that the interval of convergence of the series \( \sum_{n=0}^{\infty} a_n x^n \) is \((-4,4)\). What is the radius of convergence for \( \sum_{n=0}^{\infty} a_n x^{2n} \).

9. Find the arc length of the graph of \( y = \frac{1}{2} x^2 \) from \( x = 0 \) to \( x = 1 \).

10. Evaluate the integral \( \iint_{R} (x+y)^2 \sin^2(x-y) \, dA \), where \( R \) is the region bounded by the square with vertices at \((\pi,0), (3\pi/2, \pi/2), (\pi, \pi)\) and \((\pi/2, \pi/2)\).