Exam of Calculus

2008.04.25

1. Evaluate the following problems if possible:

(1) \( \lim_{x \to 0} x \ln x \).

(2) \( \int (\cos x)^2 dx \).

(3) \( \int \frac{1}{\sqrt{4 - 6x + 2x^2}} dx \).

(4) \( \int_0^1 |x - 2| dx \).

2. Differentiate \( y = x^{\sqrt{3}}, x > 0 \).

3. Find the area under the graph of \( f(x) = \frac{1}{1 + x^2} \) on the interval [-1,1].

4. Find the volume \( V \) of the solid that formed by revolving the region bounded by the graphs of \( x = y^2 - 2y \) and \( x = 3 \) about the line \( y = 1 \).

5. Find a power series representation for \( \sqrt{1 + x} \).

6. Test for convergence of \( \sum_{n=1}^{\infty} \frac{e^n}{4^n} \).

7. Evaluate the double integral \( \int \int_R e^{x+y} dA \) over the region \( R \) bounded by the graphs of \( y = 1, y = 2, y = x, \) and \( y = -x + 5 \).