Exam 2 (Part I)

Due on Friday, December 5, 2008

Name: ________________________________

This is a closed book exam. Show all significant work and justify all your answers.

1. Compute the arc length along the portion of the cycloid given by the parametric equations
   \[ x = t - \sin t \quad \text{and} \quad y = 1 - \cos t, \]
   for \( t \in \mathbb{R} \),
   from the point \((0, 0)\) to the point \((2\pi, 0)\).

2. Evaluate the iterated integral
   \[ \int_{0}^{4} \int_{y/2}^{2} e^{-x^2} \, dx \, dy. \]

3. Let \( R \) denote the parallelogram with vertices \((0, 0)\), \((2, 2)\), \((3, 4)\) and \((1, 2)\).
   Use an appropriate change of variables and the change of variables formula to evaluate the integral
   \[ \int_{R} xy \, dx \, dy. \]