Second Examination
Monday, March 19, 2007

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet. Each entire problem is worth 50 points.

1. State whether or not the following integrals converge. Give your reasoning in each case.

   a. $\displaystyle\int_0^1 \frac{dx}{x^\pi}$
   b. $\displaystyle\int_1^\infty \frac{dx}{x^\pi}$
   c. $\displaystyle\int_0^1 \frac{dx}{\pi^x}$

   d. $\displaystyle\int_1^\infty \frac{dx}{\pi^x}$
   e. $\displaystyle\int_1^\infty \frac{x^\pi}{\pi^x}dx$

2. Compute the coordinates of the center of mass of an object with constant density ρ grams per square centimeter, and which is described by the region between the curves $y = x^2$ and $y = x^3$.