Homework 7, Calc III

Due Friday April 3rd, 2009

1. Use polar coordinates to combine the sum

$$\int_{-\sqrt{3}}^{-\sqrt{3/2}} \int_{\sqrt{3-x^2}}^{-x} xy^2\,dy\,dx + \int_{-\sqrt{7/2}}^{-\sqrt{3}} \int_{0}^{-x} xy^2\,dy\,dx + \int_{-\sqrt{7}}^{-\sqrt{7/2}} \int_{0}^{\sqrt{7-x^2}} xy^2\,dy\,dx$$

   into a single integral and solve it. It might help to sketch the domains of integration for the integrals first.

2. (a) Evaluate the following integral

$$\int\int_R xy\,dA$$

   where R is the region in the first quadrant of the xy-plane bounded by the curve $4x^2 + 16y^2 = 64$, the line $2y = x$ and the line $y = 0$.

   (b) Set up (but do not solve) the integral(s) you would need to evaluate if R is the piece of the domain $\{\,(x, y)\,|\,x \geq y^2\,\}$ bounded by the curves $x^2 + 2y^2 = 3$ and $y^2 = x$.

3. Evaluate the following integral

$$\int\int\int_E z\,dV$$

   where E is the region bounded by the cylinder $y^2 + z^2 = 9$ and the planes $x = 0$, $y = 3x$, and $z = 0$ in the first octant.