Complete the following problems and submit your solutions at the beginning of class on Tuesday. If you use notebook paper, please remove the jagged edges of the paper before submitting your homework. Your solutions must be numbered and submitted in the order the problems were given, legibly written using correct notation and including all mathematical details. If you submit work that is disorganized, messy, or lacking detail, you should expect to receive little credit regardless of having the correct final answer.

Due: 9:00am on Tuesday, January 14

For each of the following double integrals, you must sketch the region of integration and indicate the order of integration.

1. Evaluate the following double integrals over the given regions.

   (a) $\displaystyle\iint_R ye^{xy}dA$ where $R = [0,2] \times [0,4]$

   (b) $\displaystyle\iint_D y\sqrt{x^2 - y^2}dA$ where D is the triangle with vertices $(0,0)$, $(2,0)$ and $(2,2)$.

   (c) $\displaystyle\iint_D 2xy^3dA$ where D is the region bounded by $y = x$, $y = \dfrac{1}{x}$ and $y = 2$.

2. By changing the order of integration, evaluate the integral

$$\int_0^2 \int_{x^2}^4 \sqrt{y}\sin y\,dy\,dx$$

3. Use a double integral to find the volume of the following solids.

   (a) The solid that is bounded by the coordinate planes and the plane $2x + 3y + z = 6$.

   Note: This solid is a tetrahedron. It can be easily drawn by using the lines of intersection between the slant plane and the coordinate planes.

   (b) The solid enclosed by the parabolic cylinder $y = 2 - x^2$ and the planes $z = 2 - y$, $y = x$ and $z = 0$.

   Note : Surfaces that do not depend on z are vertical surfaces.