MATH 353 Midterm Supplement

1. Describe in the xyz - space the following sets

   (a) where $\rho = x$ (ρ is from spherical coord.);

   (b) where $\rho = -2y$.

2. Set up the integral $\iiint_B z \, dxdydz$ where B is the region in the first octant

   below the plane $z = 2$ and above the plane $3x + 2y - 6z = 0$ as iterated integrals

   (a) with $\int dz$ inside ; (b) with $\int dz$ outside then evaluate only once.

   Set up the integral $\iiint_B \frac{dxdydz}{\sqrt{x^2+y^2+z^2}}$

   where $B = \{(x, y, z) \, ; x^2 + y^2 + z^2 \leq 4 \, ; x^2 + y^2 \geq 3, x \geq 0, y \geq 0\}$

   as iterated integrals (a) in spherical coordinates; (b) in cylindrical coordinates,

   then evaluate only once.

3. Evaluate $\iiint_B \frac{dxdydz}{z-6}$ where B is the solid bounded by planes $x = 0, y = 0, z = 0,$

   and $3x + 3y + z = 6$. HINT: Iterate in such a way that $\int dz$ is outside!

4. Set the integral $\iiint_B z \, dxdydz$ where $B = \left\{x^2 + y^2 + z^2 \leq 2, z \geq 0, y \geq 0, x^2 + y^2 \geq z\right\}$

   as iterated integrals in both (a) cylindrical and (b) spherical coordinates

   then evaluate only one of the above .

5. Evaluate $\iiint_B \sqrt{x^2 + 2y^2} \, dxdydz$ where B is the solid bounded

   by surfaces $z = x^2 + y^2$and $z = 4 - x^2 - 3y^2$.

   For the solid B in the first octant bounded by the coordinate planes,

   the plane $y + z = 2$ and the surface $x = 4 - y^2$.

   set up two different ways of integration of $\iiint_B f dxdydz$

   (a) (double first,then single) $\iint_{D_o} \left(\int f dz \right) dxdy$; sketch D_0;

   (b) (single first,then double) $\int_a^b \left(\iint_{D_z} f dxdy \right) dz$; sketch D_z.