

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 $\iiint_B z \, dx dy dz$ 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 $\iiint_B \frac{dx dy dz}{\sqrt{x^2 + y^2 + z^2}}$

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 $\iiint_B \frac{dx dy dz}{z - 6}$ 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 $\iiint_B z \, dx dy dz$ where $B = \{x^2 + y^2 + z^2 \leq 2, z \geq 0, y \geq 0, x^2 + y^2 \geq z\}$

as iterated integrals in both (a) cylindrical and (b) spherical coordinates then evaluate only one of the above .

5. Evaluate $\iiint_B \sqrt{x^2 + 2y^2} \, dx dy dz$ 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 $\iiint_B f \, dx dy dz$

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

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