

# Homework IV Second-Half

Due in class August 01 2017

0. Read The Following Sections:

Chapter 12 Multiple Integrals: Section 12.5 Triple Integral 12.8 Change of Variables in Multiple Integrals

1. Evaluate the triple integral

$$\iiint_E y \, dV$$

where  $E = \{(x, y, z) \in \mathbb{R}^3 \mid 0 \leq y \leq 1, y \leq x \leq 1, 0 \leq z \leq xy\}$

2. Evaluate the triple integral

$$\iiint_E xy \, dV$$

where  $E$  is bounded by the parabolic cylinder  $y = x^2$  and  $x = y^2$  and the planes  $z = 0$  and  $z = x + y$

3. Use a triple integral to find the volume of the solid enclosed by  $y = x^2 + z^2$  and  $y = 8 - x^2 - z^2$

4. Express the integral

$$\iiint_E f(x, y, z) \, dV$$

as an iterated integral in six different ways, where  $E$  is the solid bounded by the surfaces  $y = x^2$ ,  $z = 0$  and  $y + 2z = 4$

5. Rewrite the following integral in the other five orders:

$$\int_0^1 \int_{\sqrt{x}}^1 \int_0^{1-y} f(x, y, z) dz dy dx$$

6. Use the transformation  $x = 2u + v$ ,  $y = u + 2v$  to evaluate the integral:

$$\iint_R (x - 3y) dA$$

where  $R$  is the triangular region with vertices  $(0, 0)$ ,  $(2, 1)$ ,  $(1, 2)$

7. Use the transformation  $x = au$ ,  $y = bv$ ,  $z = cw$  to evaluate the integral:

$$\iiint_E 1 dV$$

where  $R$  is the region bounded by the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

8. Evaluating the integral by making an appropriate change of variable:

$$\iint_R (x + y)e^{x^2 - y^2} dA$$

where  $R$  is the rectangular region enclosed by the lines  $x - y = 0$ ,  $x - y = 2$ ,  $x + y = 0$  and  $x + y = 3$