# Math 53 DIS 103/105 Worksheet: 15.8/15.9

Kai-Chieh Chen

April 7, 2016

## Today:

§15 Evaluate the volume of the ball $x^2 + y^2 + z^2 \leq a^2$ in the following different ways.

(1) Set up the double integral $\iint_{D_1} f(x, y)dA$, where $D_1$ is on $x - y$ plane.

(2) Set up the double integral $\iint_{D_2} f(x, y)dA$, where $D_2$ is on $x - z$ plane.

(3) Set up the triple integral in standard coordinates.

(4) Set up the triple integral in cylindrical coordinates.

(5) Set up the triple integral in spherical coordinates.

§15.8 *(26) Evaluate $\iiint_E xe^{x^2+y^2+z^2}dV$, where $E$ lies above the cone $z = \sqrt{x^2 + y^2}$ and between the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$.

§15.9 (5) Find the Jacobian of the transformation $x = uv$, $y = vw$, $z = wu$.

§15.9 (9) Find the image of the set $S$, which is the triangular region with vertices $(0, 0)$, $(1, 1)$, $(0, 1)$, under the transformation $x = u^2$, $y = v$.

§15.9 (19) Evaluate $\iint_R xydA$, where $R$ is in the first quadrant bounded by $y = x$, $y = 3x$, $xy = 1$ and $xy = 3$, by using the transformation $x = u/v$, $y = v$.