

# Math2204: Written HW7 (Due Friday 10/25, 5pm)

No calculator or other electronic devices for written HWs.

Include a formula you use, e.g. for volume, in the write-up of that problem.

Hand in **ALL WORK AND REASONING** for the following problems.

■ **Section 15.7:** 2a, 3a, 11. For #11: Sketch in both  $rz$  and  $xyz$ .

■ **Section 15.8:** 2a, 3a, 7, 8. For #7 and #8: Sketch in both  $rz$  and  $xyz$ .

All problems below require a sketch in both  $rz$  AND  $xyz$ .

■ **Section 15.7:** 21. For #21: set up in cylindrical coordinates only.

■ **Section 15.8:** 23, 43, 45. For #43 and #45: set up in spherical coordinates only.

A) Let  $E$  be the part of the solid that lies in the first octant, outside  $x^2 + y^2 = 1$ , and inside  $x^2 + y^2 + z^2 = 4$ . The density is  $\delta(x, y, z) = \sqrt{x^2 + y^2 + z^2}$ .

Set up a triple integral for the mass and the  $x$ -coordinate of the center of mass in

1. cylindrical coordinates.
2. spherical coordinates.

B) Let  $E$  be the solid inside  $x^2 + y^2 + z^2 = 1$  and above  $z = \sqrt{x^2 + y^2}$ .

Set up a triple integral for  $\iiint_E y^2 \, dV$  in

1. cylindrical coordinates.
2. spherical coordinates.

C) Set up a triple integral in either cylindrical or spherical coordinates for the volume of the solid  $E$ , whichever one is easier.

Briefly explain why your choice is easier to set up or would be easier to evaluate.

1.  $E$  is inside  $x^2 + y^2 + z^2 = 4$  and outside  $x^2 + y^2 + z^2 = 2$ .
2.  $E$  is bounded by  $z = 12 - x^2 - y^2$  and  $z = \sqrt{x^2 + y^2}$ .