Homework 9: More Problems

1 This exercise is practice in moving between our three coordinate systems in space: rectangular, cylindrical, and spherical. Write each of the following points in the other two coordinate systems.

(a) $(x, y, z) = (2, -2, 2\sqrt{2})$

(b) $(r, \theta, z) = (3, \frac{\pi}{3}, -4)$

(c) $(\rho, \theta, \phi) = (4, \frac{\pi}{4}, \frac{3\pi}{4})$

(d) $(\rho, \theta, \phi) = (2, \frac{\pi}{3}, \frac{\pi}{4})$

2 This exercise is more practice in moving between our three coordinate systems in space. Write each of the following surfaces as equations in the other two coordinate systems. Sketch the resulting surface.

(a) $\rho = 4\sin(\phi)$

(b) $r = 2\cos(\theta), \quad (0 \leq \theta \leq \frac{\pi}{2})$

(c) $z = x^2 - y^2$

(d) $r = \sqrt{1 + z^2}$

3 This exercise is even more practice in moving between our three coordinate systems in space. Write each of the following solids as inequalities in the other two coordinate systems. Sketch the resulting solid.

(a) $0 \leq \theta \leq \frac{\pi}{2}, \quad r \leq 1$

(b) $0 \leq \theta \leq \frac{\pi}{2}, \quad \rho \leq 1$

(c) $2 \leq \rho \leq 4, \quad \phi \leq \frac{\pi}{3}$

(d) $0 \leq z \leq r$