

**Instructions:** Show all work. Use exact answers unless otherwise asked to round.

1. Find the domain and range of  $f(x, y) = \sqrt{9 - x^2 - 9y^2}$  and sketch the domain in the plane.

2. Consider the function  $f(x, y) = \sqrt{x^2 - y^2}$ . Convert the function to the indicated coordinate system or format.

a. Write  $f$  in spherical coordinates.

b. Write  $f$  in cylindrical coordinates.

c. Write  $f$  in parametric surface form,  $\vec{r}(u, v)$ .