1. Find the domain of the function \( f(x, y) = \sqrt{9 - x^2 - y^2} \)

**Solution:** When considering the domains of functions we need to think of operations that “aren’t allowed.” These include taking square roots of negative values, dividing by zero, or taking the natural log of non-positive values. In the case of \( f(x, y) = \sqrt{9 - x^2 - y^2} \) we need to consider what values of \( x \) and \( y \) might lead to taking the square root of a negative value. Therefore we set up the inequality \( 9 - x^2 - y^2 \geq 0 \) We then rearrange to find this equivalent to \( x^2 + y^2 \leq 9 \). This is the domain of our function, and if we were to graph it in the \( x, y \) plane, we would see a solid bordered, filled-in circle of radius 3 centered at the origin.