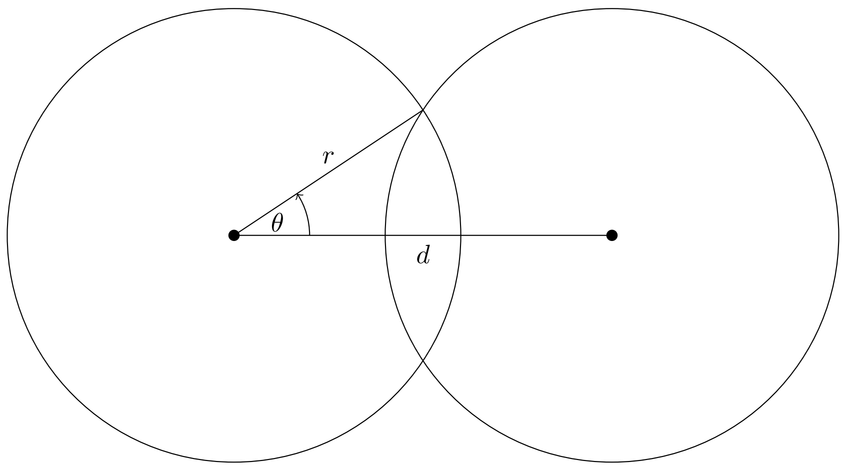
First, let r denote the radius of both circles and d denote the distance between the center of the two circles. Also let A_C be the total area of the circle (so $A_C = \pi r^2$) and let A_I be the area of the intersection of the two circles. Given r, we want to find d such that the area of the circle excluding the intersecting area (given by $A_C - A_I$) is equal to the intersection area A_I. That is,

$$A_C - A_I = A_I \Rightarrow A_C = 2A_I. \tag{1}$$

We can use integration in polar coordinates to find A_I. First, we need to find the limits of integration by finding θ in the figure below.



Using the definition of the cosine, we can see that $\cos(\theta) = (d/2)/r$, which implies that $\theta = \arccos(d/(2r))$.

Next, we can find the distance between the left circle's center and the edge of the right circle, which will be denoted with $f(\varphi)$ for angle φ. This is shown in the picture below.