NMU Math & CS Department

Problem of the Month, March 2023

Draw a quarter circle of radius one centered at $(0,0)$. Then draw a quarter circle centered at $(1,1)$ with appropriate radius so that it is tangent to the first quarter circle.

Find the exact value of the radius of the small circle (in the form $r + s\sqrt{d}$ where $r, s \in \mathbb{Q}, d \in \mathbb{N}$) that is tangent to both quarter circles and the vertical line, as illustrated.