Example. Find the points of intersection of
\[ r = 1 + \cos \theta \quad \text{and} \quad r = 3 \cos \theta \]
\[ 0 \leq \theta \leq 2\pi. \]

Solution

\[ 3 \cos \theta = 1 + \cos \theta \]
\[ 2 \cos \theta = 1 \]
\[ \cos \theta = \frac{1}{2} \]
\[ \theta = \frac{\pi}{3}, \frac{5\pi}{3} \text{ on } [0, 2\pi) \]

Observe
\[ (0, \frac{\pi}{3}) \text{ satisfies } r = 1 + \cos \theta \]

Also
\[ (0, \frac{\pi}{2}) \text{ and } (0, \frac{3\pi}{2}) \text{ satisfy } r = 3 \cos \theta \]

So, the pole is also a point of intersection.