Let us define

$$\mathcal{I} = \begin{cases} \left(\frac{\pi}{2} - \alpha, \frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2} - \alpha, \frac{3\pi}{2}\right), \\ \qquad\qquad \text{if } 0 < \alpha < \frac{\pi}{2} \\ \left[0, \frac{\pi}{2}\right) \cup \left(\frac{3\pi}{2} - \alpha, \frac{3\pi}{2}\right) \\ \qquad \cup \left(\frac{5\pi}{2} - \alpha, 2\pi\right], \text{if } \frac{\pi}{2} < \alpha < \pi \end{cases}$$

Then for $\theta \in [0, 2\pi]$ we have

$$f(\theta) = 1 \iff \theta \in \mathcal{I}$$