Example

Find the point \((r, \theta)\) symmetric to the given point \(\left(\frac{1}{2}, \frac{1}{6}\pi\right)\) (a) about the \(x\)-axis; (b) about the \(y\)-axis; (c) about the origin. Express your answer with \(r > 0\) and \(\theta \in [0, 2\pi)\).

(a) The point symmetry about the \(x\)-axis is given by
\[
\left(\frac{1}{2}, -\frac{1}{6}\pi\right) \text{ or } \left(\frac{1}{2}, \frac{11}{6}\pi\right);
\]

(b) The point symmetry about the \(y\)-axis is given by
\[
\left(\frac{1}{2}, \pi - \frac{1}{6}\pi\right) \text{ or } \left(\frac{1}{2}, \frac{5}{6}\pi\right);
\]

(c) The point symmetry about the origin is given by
\[
\left(\frac{1}{2}, \pi + \frac{1}{6}\pi\right) \text{ or } \left(\frac{1}{2}, \frac{7}{6}\pi\right).
\]