1. Find the general expression, in polar coordinates, for the steady-state temperature \( u(r, \theta) \) in a circular plate of radius 1, if the temperature on the circumference \( r = 1 \) is given by \( u(1, \theta) = \cos 7\theta \).

2. Find the general expression, in polar coordinates, for the steady-state temperature \( u(r, \theta) \) in a circular plate of radius 2, if the temperature on the circumference \( r = 2 \) is given by \( u(2, \theta) = 3\cos 5\theta + 11\sin 3\theta - 19\sin 29\theta \).

3. Find the general expression, in polar coordinates, for the steady-state temperature \( u(r, \theta) \) in a circular plate of radius 2, if the temperature in the top half of the circumference (above the \( x \)-axis) is 100 degrees and at the bottom half is 0.

4. Find the general expression, in polar coordinates, for the steady-state temperature \( u(r, \theta) \) in a circular plate of radius 3, if the temperature on the circumference at the top half \((0 < \theta < \pi)\) is \( \theta \) degrees and at the bottom half \((\pi < \theta < 2\pi)\) is \( \pi - \theta \).

5. Find the general expression, in polar coordinates, for the steady-state temperature \( u(r, \theta) \) in the infinite plane with a circular hole of radius \( c \) cut-out, and where the temperature at the bounding ring is \( u(c, \theta) = f(\theta), 0 < \theta < 2\pi \).