1. (10 points) 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 2 cut-out, and where the temperature at the bounding ring is \( u(2, \theta) = \cos 2\theta - 3 \sin 4\theta, 0 < \theta < 2\pi \).