1. Prove that the function \( u = C_1 + C_2 \text{Arg}(z) \) is a solution to Laplace’s equation (harmonic) by showing that it is the real or imaginary part of an analytic function.

2. Consider the electrostatic potential \( \phi \) between two infinite flat conducting (isopotential) plates in the plane: one along the positive real axis, held at \( \phi = 0 \), and another one starting at the origin and situated straight up along the y (positive imaginary) axis and meeting the first plate at 90°. The second plate is held at \( \phi = 10 \text{ Volts} \) (there is a small insulator between the two plates at the origin!) Recall that in such an electrostatics problem, \( \nabla^2 \phi = 0 \) in the region bounded by the plates.

Using the answer from the previous problem, write out the potential function \( \phi(x, y) \) which solves this problem, for \( x \) and \( y \) restricted to be in the proper region.