Problem 1. import cmath

# Complex potential function for flow around a cylinder

def complex\_potential\_cylinder(z, U, a):

return U \* (z + (a\*\*2 / z))

def velocity\_potential\_cylinder(z, U, a):

return complex\_potential\_cylinder(z, U, a).real

def stream\_function\_cylinder(z, U, a):

return complex\_potential\_cylinder(z, U, a).imag

# Inputs

U = float(input("Enter the uniform velocity (U): "))

a = float(input("Enter the radius of the cylinder (a): "))

x = float(input("Enter the x-coordinate: "))

y = float(input("Enter the y-coordinate: "))

z = complex(x, y)

# Calculate and display results

φ\_cylinder = velocity\_potential\_cylinder(z, U, a)

ψ\_cylinder = stream\_function\_cylinder(z, U, a)

print(f"Velocity Potential (φ): {φ\_cylinder}")

print(f"Stream Function (ψ): {ψ\_cylinder}")