1. Prove that the complex plane slit along the union of rays $\bigcup_{k=1}^{n} \{ A_k + iy : A_k \text{ is real and } y \leq 0 \}$ is simply connected.

2. Prove that the function $u$ defined by $u(x, y) = \text{Re}(\frac{z}{1-z})$ and $u(0, 1) = 0$ is harmonic in the unit disc and vanishes on its boundary.