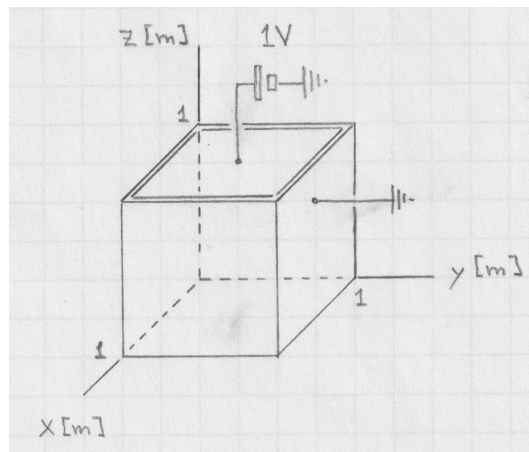


[lex127] Electrostatic potential inside rectangular box II

A cubic box consisting of conducting sides with edges of $l = 1\text{m}$ length is positioned into a Cartesian coordinate system as shown. The top square is insulated from the the other five sides. The former is held at electric potential $V = 1\text{V}$ and the latter are grounded.

(a) Use the series expansion for $\Phi(x, y, z)$ inside the box determined in [lex126] to calculate the charge density on three of the sides in the form of series expansions: $\sigma(x, y, 0)$, $\sigma(x, y, 1)$, and $\sigma(0, y, z)$.

(b) Use contour plots to visualize the surface charge density on the three sides of the cube and explain in words how electric charge is distributed across them.



Solution: