1. In the notes, we worked an example where the potential along the x-axis is zero and the potential in the x-direction at $y = a$ is also zero, but the potential along $x = 0$ from $y = 0$ to $y = a$ was a constant φ_0. For this problem, change the potential along the back wall from a single constant, to two constants, so that the potential from $y = 0$ to $y = a/2$ is φ_0 and the potential from $y = a/2$ to $y = a$ is $-\varphi_0$. Also plot the first several terms of this in Mathematica and do a version of this in Excel with the relaxation method and plot that as well.

2. For the first example problem (which I also referenced in the previous problem), what would be the surface charge density σ of the back plate assuming it was a conductor maintained at a the uniform potential of φ_0?

3. A rectangular pipe runs along the z-axis. Three of its sides are maintained at $\varphi = 0$ (so they are grounded): $y = 0$, $y = a$, and $x = 0$. The fourth side at $x = b$ is a constant potential φ_0. What is a general expression for the potential inside the pipe? Plot several terms of this in Mathematica and build an Excel model and plot that as well.

4. A cubical box with side lengths a has a 5 sides that are grounded, but the top side is maintained at constant potential φ_0. What is a general expression for the potential inside the box?