PHYS 330 Electromagnetic Theory - Final Project Proposal

For my final project, I would like to solve two problems from the textbook: Problems 2.52 and 3.10. Problem 3.10 utilizes the solution to 2.52. I will create a presentation that gives detailed explanations of how I solved each problem or solve them on the whiteboard in front of the class while following my notes on how I solved them beforehand.

Problem 2.52: Two infinitely long wires running parallel to the x axis carry uniform charge densities $+\lambda$ and $-\lambda$ (Fig. 2.54).

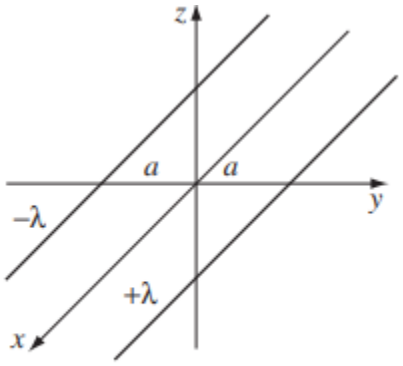

FIGURE 2.54

(a) Find the potential at any point (x, y,z), using the origin as your reference.

(b) Show that the equipotential surfaces are circular cylinders, and locate the axis and radius of the cylinder corresponding to a given potential V0.

Problem 3.10: A uniform line charge λ is placed on an infinite straight wire, a distance d above a grounded conducting plane. (Let's say the wire runs parallel to the x-axis and directly above it, and the conducting plane is the x y plane.)

(a) Find the potential in the region above the plane. [Hint: Refer to Prob. 2.52.]

(b) Find the charge density σ induced on the conducting plane.