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28. (a) Find equations for the curves describing electric field lines for the boundary conditions $V(x, 0) = V_o$ for $x \geq a$ and $V(x, 0) = -V_o$ for $x \leq -a$.

The equipotentials were found in lecture to be hyperbolas. The map is

$$f(z) = \frac{2b}{\pi} \arcsin\left(\frac{z}{a}\right)$$

- (b) Plot the boundary, the equipotential curves, and the electric field lines using a graphing package like Mathematica (not by hand).

29. Duplicate figure π (that is, figure 3.14) in Jackson by making a contour plot of the potential (equation 3.170) near a circular hole in a conducting sheet.

Bonus:(5 points added to the final exam score) Due when the homework is due.

For the conformal map $z = \frac{a}{2\pi}(1 + f + e^f)$ for a semi-infinite capacitor showing edge effects, use a computer plotting package to draw the lines representing equipotentials and electric fields. The electric field lines should be perpendicular to the conducting plates both inside and outside the capacitor.