25. A rectangular channel, infinitely long in the z direction, extends from 0 to a in the x direction and from 0 to b in the y direction. Take the origin at the lower left corner of the rectangle. The top, left, and bottom sides are grounded while the voltage on the right is held constant at V_0.

    (a) Find the electric field $\vec{E}(x, y)$ in the channel.

    (b) Find the surface charge density $\sigma(x)$ on the bottom ($y = 0$).

26. For each of the following, state whether or not the expression satisfies the Cauchy-Riemann equations. If it does, rewrite the expression as a function of z (and not z^*).

    (a) $e^x[\cos(y) + i\sin(y)]$

    (b) $e^{x^2-y^2}[\cos(2xy) + i\sin(2xy)]$

    (c) $\cos(x)\cosh(y) - i\sin(x)\sinh(y)$

    (d) $x^2 + y^2 + 2ixy$

27. Show that $z(f) = \frac{a}{2\pi}(1 + f + e^f)$ is analytic by satisfying the Cauchy-Riemann equations. Show that the inverse map $f(z)$ is analytic by satisfying the Cauchy-Riemann equations. You will not be able to isolate f, so you need to be clever.