Class Exercise 3.

1. Find the image of the quadrant $x > 1$, $y < 0$ under the transformation $w = 1/z$. Point out the images of the boundaries of the quadrant.

2. Express the mapping $w = f(z) = (z+1)/(z-1)$ as a combination of simpler mappings. Hence find the image of the half-plane $x > 0$ under the mapping $w = f(z)$.

3. Show that $\sin z = \sin x \cosh y + i \cos x \sinh y$.

   [Harder!] By considering the images of vertical lines $x = c$ $(-\pi/2 \le c \le \pi/2)$, show that $w = \sin z$ is a $1 - 1$ mapping of the strip $-\pi/2 \le x \le \pi/2$, $y \ge 0$ onto the upper half of the w-plane. Describe corresponding portions of the boundaries.

4. Find the image of the semi-infinite strip $x \ge 0$, $0 \le y \le \pi$ under the transformation $w = \exp z$, and describe corresponding portions of the boundaries.