Problem 1:

The map described in class is $f \circ g \circ h$, where $f(z) = \frac{z-1}{z+1}$, $g(z) = \sqrt{z}$, and $h(z) = \frac{z-1}{z+1}$.

Its inverse is thus $h^{-1} \circ g^{-1} \circ f^{-1}$, which is $F : D_1(0) \to \overline{\mathbb{C}} \setminus [-1, 1]$ where $F(z) = \frac{\left(\frac{z+1}{1-z}\right)^2+1}{1-\left(\frac{z+1}{1-z}\right)^2} = \frac{-z^2-1}{2z}$.

Consider the set $\partial D_r(0)$ where $r < 1$. We see that $F(\partial D_r(0)) = \{\frac{-z^2-1}{2z} : |z| = r\}$

Problem 2:

Problem 3:

Problem 4:

Problem 5:

Problem 6:

Problem 7: