

$$f^{-1}(z) = v \Leftrightarrow f(w) = z \quad z \in D' \cup \infty$$

$$f(z) = -3iz + 1$$

$$f(z) = w, \quad z = f(w)$$

$$w = -3iz + 1$$

$$w = -3i f(w) + 1$$

$$w - 1 = -3i f(w)$$

$$f(w) = \frac{1-w}{3i} = \frac{wi-i}{3}$$