Complex Variables II PROBLEM SET 1 Due January 30, 2007

1.* Determine the pre-images of all straight lines through the origin in the w-plane, under the mapping

$$w = i\frac{z-i}{z+i}.$$

(Hint: Try first the axes $u = 0$ and $v = 0$, then look at the general line $v = \alpha u$ for some finite α.)

2. Problem 6, page 323 of text

3.* Consider the quadrant $Q = \{z = (x, y) : x > 0, y > 0\}$ Find all maps of Q onto the disc $D = \{z : |z| < 1\}$ that sends the boundary points (0,0) and ∞ into (0,1) and (0,-1) respectively on ∂D. (Hint: First map the quadrant onto the upper half-plane using z^2. Then find the relevant LFTs.)

4. Problem 4, page 328 of text.

5. Problem 4, page 358 of text.

6. Problem 8, page 359 of text.