Section 2.1.1 #2, 3 (omit sketches for #3), 4, 6, 9  
Section 3.4 #1, 2, 7d, 10  
Problems (I), (II) below

(I) Find and sketch the inverse image of the region \( \{w : -2 < \text{Re } w < -1\} \) under the mapping \( f(z) = z^2 \). You don’t have to sketch precisely, but do label any points where the boundary of your region crosses an axis.

(II) Let \( f(z) = e^z \), defined on the strip \( \{z : -\pi < \text{Im } z < \pi\} \). Find and sketch the inverse image (in this strip) of the region \( \{w : \frac{1}{2} < |w| < 4\} \).

**HINTS FOR 2.1.1:**

(9) See Exercise p. 21, p. 86.

**HINTS FOR 3.4:**

(1) If a domain \( D \) includes all of the right half plane, and at least one point \( z_0 \) in the left half plane, how do we know \( g(z) = z^2 \) isn’t one-to-one?

(2) Besides the text hint, use Example 4.

(10) Use Example 4. From the formula there, the equation \( f(z) = z \) for a fixed point becomes a quadratic equation satisfied by \( z \). You need to show you can’t have both roots inside the unit disc. (One choice of \( f \) is an exception to this.) You can try expressing the roots using the quadratic formula, or if that is too messy, use properties of the roots that you can determine readily just from looking at the quadratic equation. (You’ll need to recall some Algebra I here...)