Note that the first exam is on Wednesday 6th October, at 9:05 in Room 109 Bouke.

1. (i) Find the absolute value of \( \frac{(3 + 4i)(-1 + 2i)}{(-1 - i)(3 - i)}. \)

(ii) Show that if \( a \neq 0, \) then \( \frac{1}{a} = \frac{\bar{a}}{|a|^2}, \) and find the real part of \( \frac{4 - 3i}{1 + i}. \)

2. Find the image under the M"obius transformation \( z \mapsto w: w = \frac{z - 1}{z + 1}, \) of (a) the circle \( |z + 2| = 1, \) (b) the line \( \Re z = \Im z. \)

3. Sketch the set of points \( z \) determined by the given condition.
   (a) \( |z - 1 - i| \neq |z + 1 + i|, \)
   (b) \( |z - i - 2| > 3. \)

Which, if any, of these sets are regions?

4. (a) Prove that \( \{ z : 0 < \Re z < 1 \} \) is an open set in \( \mathbb{C} \). (b) Prove that if \( S \) and \( T \) are closed sets in \( \mathbb{C} \), then so is \( S \cup T \).