MATH 2230 Complex Variables with Applications
(2014-2015, Term 1)
Homework 4

1. (SEC.98,No.5)
   Find the image of the region $x > 1$, $y > 0$ under the transformation $w = \frac{1}{z}$.

   $$Ans. \quad (u - \frac{1}{2})^2 + v^2 < (\frac{1}{2})^2, v < 0.$$

2. (SEC.98,No.9)
   Find the image of the semi-infinite strip $x > 0$, $0 < y < 1$ when $w = \frac{i}{z}$. Sketch the strip and its image.

   $$Ans. \quad (u - \frac{1}{2})^2 + v^2 > (\frac{1}{2})^2, u > 0, v < 0.$$

3. (SEC.100,No.2)
   Find the linear fractional transformation that maps the points $z_1 = -i$,$z_2 = 0$,$z_3 = i$ onto the points $w_1 = -1$,$w_2 = i$,$w_3 = 1$. Into what curve is the imaginary axis $x = 0$ transformed?

4. Find a linear transformation which carries $|z| = 1$ and $|z - \frac{1}{4}| = \frac{1}{4}$ into concentric circles. What is the ratio of the radii; Reflect imaginary axis, $x = y$ and $|z| = 1$ into circle $|z - 2| = 1$.