

Answer on Question #67556 – Math – Complex Analysis

Question

Find the image of the half plane $y > 1$ under the transformation $w = (1-i)z$.

Solution

$$z = x + iy,$$

where

$$\begin{aligned} w &= (1 - i)z = (1 - i)(x + iy) = x - ix + iy + y = x + y + i(y - x) \\ &\quad y > 1 \\ &\quad w = u + iv, \end{aligned}$$

where

$$\begin{cases} u = x + y \\ v = y - x \end{cases}$$

Add the first and the second equations of the system

$$u + v = x + y + y - x = 2y > 2,$$

because

$$y > 1.$$

The image will be the half plane $u + v > 2$.

If we assume that $w = x + iy$, the image will be the half plane $x + y > 2$.

Answer: If we assume that $w = x + iy$, the image will be the half plane $x + y > 2$.