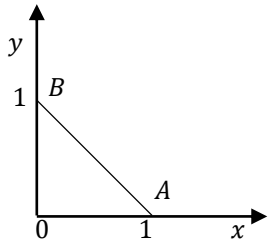




Problem:

Find the image of line L for the mapping $w = f(z)$. L is the segment, connecting the points $1, i$, where $w = (1 + i)z + 1 - i$.

Solution:



L is the line AB , i.e. points $z = x + iy$, for which $x + y = 1$, $\Rightarrow$

$$\begin{aligned} w &= (1 + i)z + 1 - i = (1 + i)(x + iy) + 1 - i = x + iy + ix + i^2y + 1 - i = \\ &= x + i(x + y) - y + 1 - i = x + i - y + 1 - i = x - y + 1 \Rightarrow w(z) = x - y + 1 = \\ &= x - y + x + y = 2x \Rightarrow w(x + iy) = 2x, x \in [0; 1] \Rightarrow 2x \in [0; 2], \Rightarrow \end{aligned}$$

$\Rightarrow$ the image of the segment AB will be the segment $[0; 2]$.

