

BMAT201L – Complex Variables and Linear Algebra

Tutorial Sheet – 2

1. Find the image of the region bounded by $x=0$, $y=0$, $x=1$, $y=2$ under the map $w = z + 2 - i$.
2. Find the image of the circle $|z|=1$ under the map $w = z + (2 + 2i)$.
3. Find the image of the rectangular region bounded by $x=0$, $y=0$, $x=1$, $y=2$ under the map $w = (1 + i)z + 2$.
4. Under the transformation $w = \frac{1}{z}$, find the image of the region i) $x > c$ where $c > 0$, and ii) $y > c$, where $c < 0$.
5. Find the image of the triangular region bounded by the lines $x=1$, $y=1$, $x+y=1$ in the z -plane under the transformation $w = z^2$.
6. Find the image of the region $r \leq 2$, $0 \leq \theta \leq \frac{\pi}{4}$ under the map $w = z^2$ where $z = re^{i\theta}$.
7. Find the bilinear transformation which maps the points $1, i, -1$ onto the points $0, 1, \infty$. show that the transformation maps the interior of the unit circle of the z -plane onto the upper half of the w -plane.
8. Find the bilinear mapping which maps $-1, 0, 1$ of the z -plane onto $-1, -i, 1$ of the w -plane. Show that this maps the upper half of the z -plane onto the interior of the unit circle $|w|=1$.
9. Find the bilinear map if 1 and i are fixed points and origin goes to -1 .
10. Find the fixed points of the bilinear map $w = \frac{2i - 6z}{iz - 3}$.