Argand Diagram (3.5)

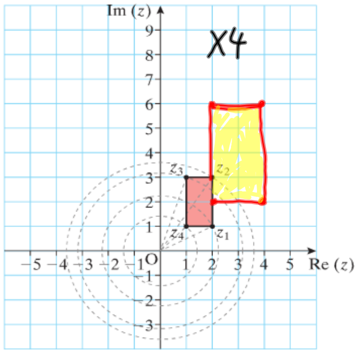
9. A rectangle is represented in the complex plane by the numbers z_1, z_2, z_3, z_4.

Copy this diagram and mark in the diagram the image of this rectangle under the following transformations

(i) $z \longrightarrow 2z$,

(ii) $z \longrightarrow (i)z$

(iii) $z \longrightarrow (2+i)z$



(i)

$z_1 = 2+1i \quad , \quad 2z_1 = 4+2i$

$z_2 = 2+3i \quad , \quad 2z_2 = 4+6i$

$z_3 = 1+3i \quad , \quad 2z_3 = 2+6i$

$z_4 = 1+i \quad , \quad 2z_4 = 2+2i$

Argand Diagram

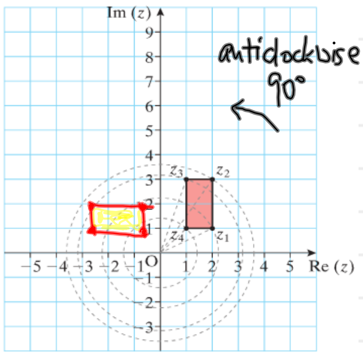
9. A rectangle is represented in the complex plane by the numbers z_1, z_2, z_3, z_4.

Copy this diagram and mark in the diagram the image of this rectangle under the following transformations

(i) $z \longrightarrow 2z$,

(ii) $z \longrightarrow (i)z$

(iii) $z \longrightarrow (2+i)z$



(i)

$z_1 = 2+1i \quad , \quad (i)z_1 = 2i + 1\cancel{i^2} = -1+2i$

$z_2 = 2+3i \quad , \quad (i)z_2 = 2i + 3\cancel{i^2} = -3+2i$

$z_3 = 1+3i \quad , \quad (i)z_3 = 1i + 3\cancel{i^2} = -3+i$

$z_4 = 1+i \quad , \quad (i)z_4 = 1i + 1\cancel{i^2} = -1+i$

Argand Diagram

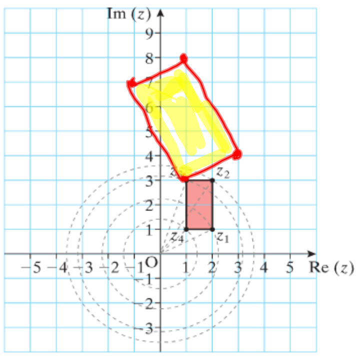
9. A rectangle is represented in the complex plane by the numbers z_1, z_2, z_3, z_4.

Copy this diagram and mark in the diagram the image of this rectangle under the following transformations

(i) $z \longrightarrow 2z$,

(ii) $z \longrightarrow (i)z$

(iii) $z \longrightarrow (2+i)z$



(iii)

$z_1 = 2+1i$, $(2+i)(2+i) = 4+2i+i+1i^2 = 3+4i$

$z_2 = 2+3i$, $(2+i)(2+3i) = 4+6i+2i+3i^2 = 1+8i$

$z_3 = 1+3i$, $(2+i)(1+3i) = 2+6i+i+3i^2 = -1+7i$

$z_4 = 1+i$, $(2+i)(1+i) = 2+2i+i+1i^2 = 1+3i$

Exercise 3.6

Remainder Theorem

1. Show that $-2+4i$ is a root of the equation $z^2+4z+20=0$ and write down the second root.

Is $f(-2+4i)=0$?

$(-2+4i)^2 + 4(-2+4i) + 20$

$= 4 - \cancel{16i} + 16i^2 - 8 + \cancel{16i} + 20$

$= +24 - 24 = 0$

$\Rightarrow$ it is a Root

Conjugate root theorem

Other Root is $-2-4i$

3. Form a quadratic equation, given a pair of roots in each case.

(i) $1 \pm 3i$ (ii) $-2 \pm i$ (iii) $4 \pm 2i$

$z^2 - (\underset{\text{Roots}}{\text{Sum}})x + (\underset{\text{Roots}}{\text{PRODUCT}}) = 0$

Sum of Roots $= (1+3i) + (1-3i) = 2$

product of Roots $= (1+3i)(1-3i) = 1 \pm 9\cancel{i^2} = 10$

$\Rightarrow \quad z^2 - 2z + 10 = 0$