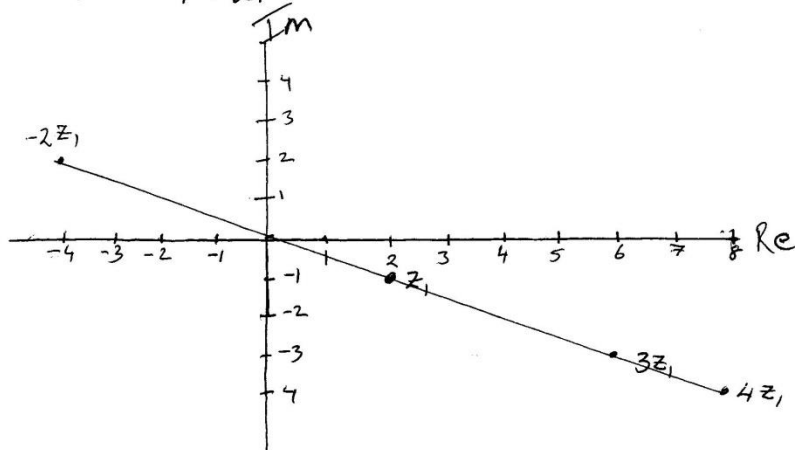


Ex 3.5

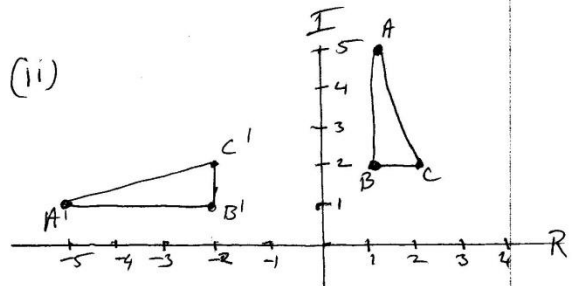
Q2 $z_1 = 2 - i$
 $3z_1 = 6 - 3i$
 $4z_1 = 8 - 4i$
 $-2z_1 = -4 + 2i$



All points on the same line - collinear points
 Multiplying stretches the distance from the origin.

Q3 A : $1 + 5i$
 B : $1 + 2i$
 C : $2 + 2i$
 D : $-2 + i$
 E : $-1 + 2i$
 F : $-2 - 2i$
 N : $-1 + i$

(i) Translation $-3 - 4i$



mult by $i \Rightarrow$ rot 90° anticlockwise

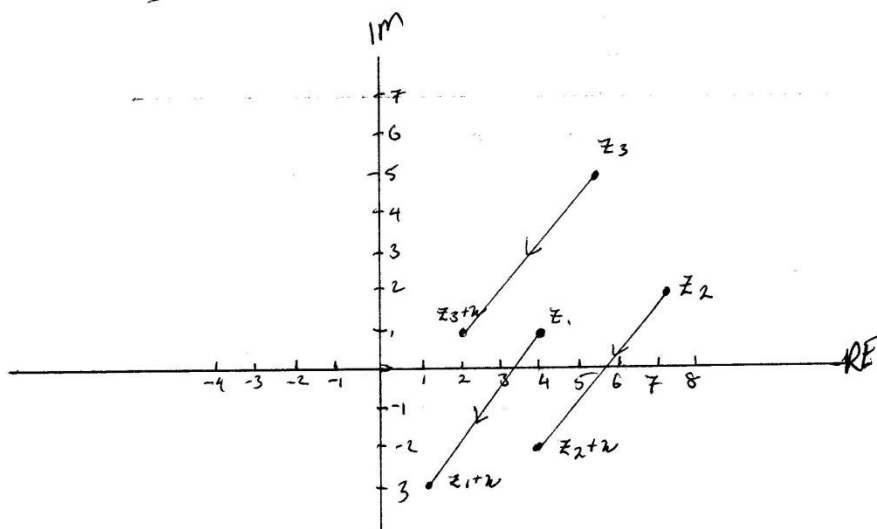
(iii) Rot of (i^2)
 followed by Translation
 of $+3$

$(1 + 5i)i = -5 + i$
 $(1 + 2i)i = -2 + i$
 $(2 + 2i)i = -2 + 2i$

Q4 $z_1 = 4+i$ $w = -3-4i$ $\bar{z}_1 = 4-i$ $z_2 = 7+2i$ $z_3 = 5+5i$
 $z_1 + w = \underline{1-3i}$

$z_2 = 7+2i$
 $z_2 + w = \underline{4-2i}$

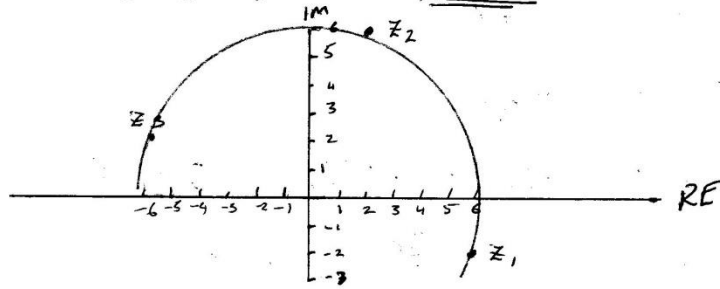
$z_3 = 5+5i$
 $z_3 + w = \underline{2+i}$



Transformation = A Translation of $-3, -2i$

Q5 $z_1 = \underline{6-2i}$, $z_2 = (6-2i)i = \underline{2+6i}$

$z_3 = (6-2i)(-1) = \underline{-6+2i}$



Mult \Rightarrow A Rotation.

Q6 (i) $z_1 = 1+2i$ $z_2 = 3+6i \Rightarrow a=3$

(ii) $z_1 = 1+2i$ $z_3 = -2+i$

$$\boxed{\begin{aligned} z_3 &= b z_1 \\ \frac{z_3}{z_1} &= b \end{aligned}}$$

$$b = \frac{z_3}{z_1} = \frac{-2+i}{1+2i} \times \frac{1-2i}{1-2i} = \frac{-2+4i+i-2i^2}{1+4} = \frac{5i}{5}$$

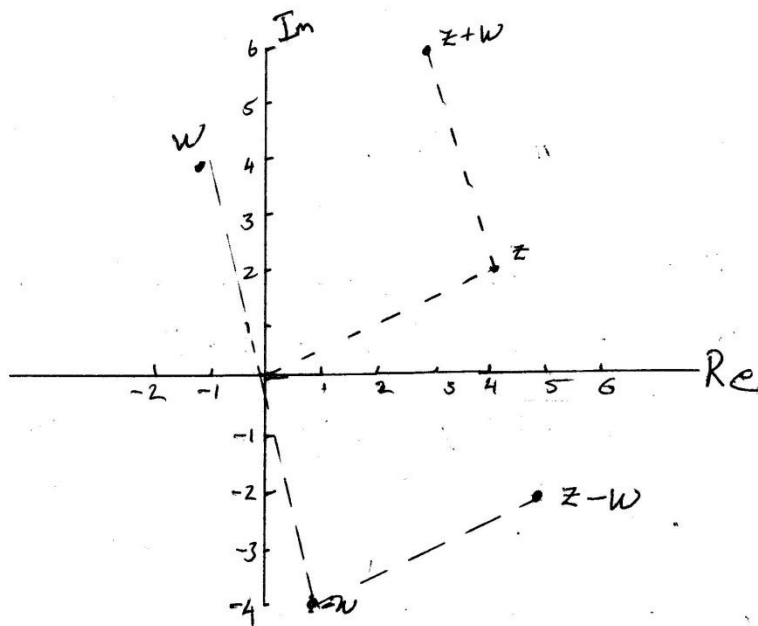
$b = i$

(iii) $z_1 = 1+2i$ $z_4 = -1-2i \Rightarrow c = -1$

Q7 $z = 4 + 2i$
 $z + w = 3 + 6i$
 $\Rightarrow w = -1 + 4i$

$-w = 1 - 4i$

$z - w = (4 + 2i) - (-1 + 4i) = 5 - 2i$



- Q8
- N.B. (i) $z \rightarrow z + k \Rightarrow$ a Translation
- (ii) $z \rightarrow kz \quad k \in \mathbb{R} \Rightarrow$ stretching/contraction from/to origin
- (iii) $z \rightarrow kz \quad k \in \mathbb{C} \Rightarrow$ combination of stretching and rotation

Q9 $z_1 = 2+i, z_2 = 2+3i, z_3 = 1+3i, z_4 = 1+i$

(i) $2z \Rightarrow 2z_1 = 4+2i, 2z_2 = 4+6i, 2z_3 = 2+6i, 2z_4 = 2+2i$

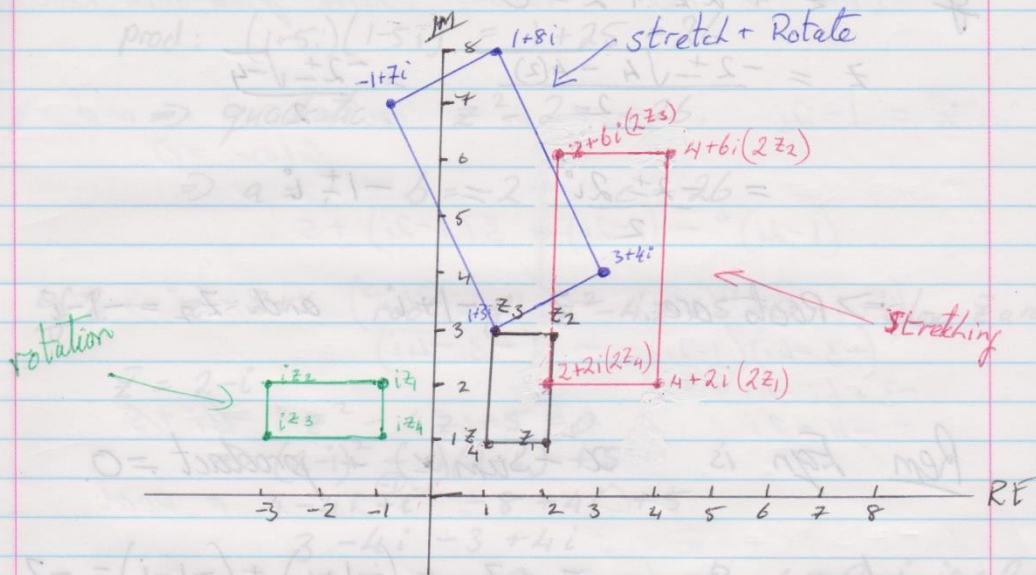
(ii) $iz \Rightarrow iz_1 = -1+2i, iz_2 = -3+2i, iz_3 = -3+i, iz_4 = -1+i$

(iii) $(2+i)z_1 \Rightarrow (2+i)(2+i) = 4+2i+2i+i^2 = 3+4i$

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

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

$(2+i)z_4 \Rightarrow (2+i)(1+i) = 2+2i+i+i^2 = 1+3i$



Q10

$z_1 = 1+2i, z_2 = -3+2i, z_3 = -2-2i$

(i) \downarrow
 Small Δ $\frac{1}{2}+i, -\frac{1}{2}+i, -1+i$
 \Rightarrow contract by factor $\frac{1}{2}$

(ii) \downarrow
 Large Δ $3+6i, -9+6i, -6-6i$
 \Rightarrow stretch by factor 3.

