

技術系専門試験問題演習講座 一般職 工学の基礎

H.15 国家II種（化学職）No.2
（数学）

(解1)

$$\frac{\alpha}{\beta} = \frac{2i}{\sqrt{3}+i} = \frac{2i(\sqrt{3}-i)}{(\sqrt{3}+i)(\sqrt{3}-i)} = \frac{2\sqrt{3}i - 2\overset{-1}{\cancel{i^2}}}{(\sqrt{3})^2 - \overset{-1}{\cancel{i^2}}} = \frac{2+2\sqrt{3}i}{4} = \frac{1+\sqrt{3}i}{2}$$

$\uparrow (a+b)(a-b) = a^2 - b^2$

$$\left(\frac{\alpha}{\beta}\right)^2 = \left(\frac{1+\sqrt{3}i}{2}\right)^2 = \frac{(1+\sqrt{3}i)^2}{4} = \frac{1+2\sqrt{3}i-3}{4} = \frac{-2+2\sqrt{3}i}{4} = \frac{-1+\sqrt{3}i}{2}$$

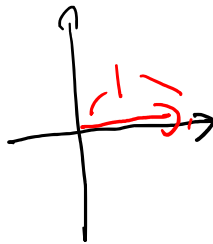
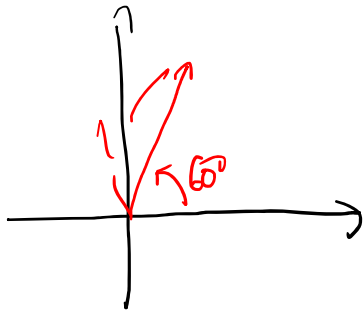
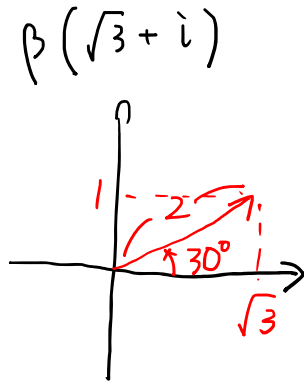
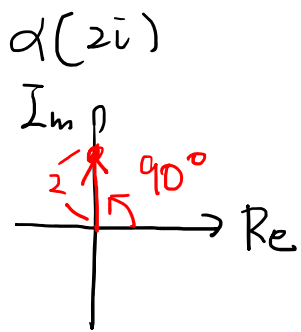
$$\left(\frac{\alpha}{\beta}\right)^3 = \left(\frac{-1+\sqrt{3}i}{2}\right)\left(\frac{1+\sqrt{3}i}{2}\right) = \frac{-1+(\sqrt{3}i)^2}{4} = -1$$

$$\left(\frac{\alpha}{\beta}\right)^6 = (-1)^2 = 1 \Rightarrow \text{A支1}$$

$$\textcircled{9} \quad z \cdot \bar{z} = |z|^2$$

$$(a+ib)(a-ib) = a^2 + b^2$$

(解2) 複素数の性質



<公式>

$\frac{\beta}{\alpha} \Rightarrow$ 大きさは計算
角度は引き算

$\frac{\beta}{\alpha} \Rightarrow$ 大きさ $\frac{2}{2} = 1$
角度 $90^\circ - 30^\circ = 60^\circ$

<公式>

$\alpha\beta \Rightarrow$ 大きさ かけ算
角度 足し算

$\left(\frac{\beta}{\alpha}\right)^6 \Rightarrow$ 大きさ $1^6 = 1$
角度 $60^\circ \times 6 = 360^\circ = 0^\circ$