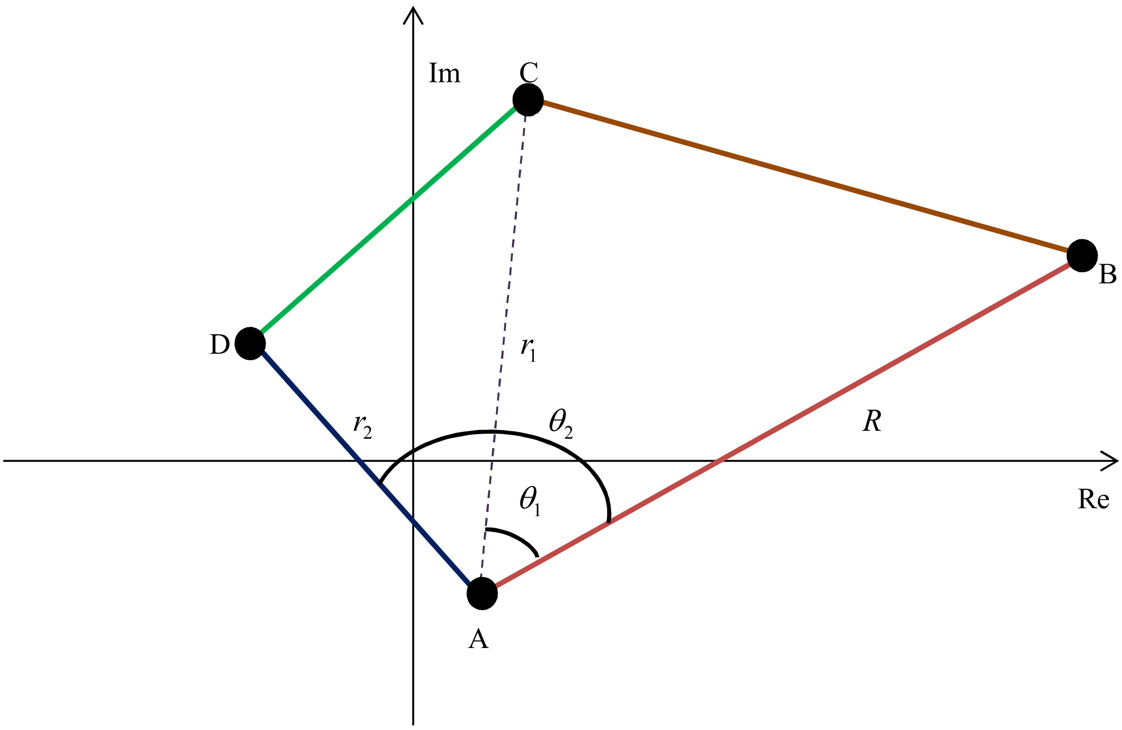

Say we are assigned complex numbers A and B represented by $r_A\, e^{i\alpha}$ and $r_B\, e^{i\beta}$ respectively, and we know them to be also vertices of a certain polygon ABCD suspended in complex Argand space, how then can we <u>discover points C and D</u> if the quantities r_1, r_2, θ_1 and θ_2 are also known?

Solving this through the use of vectors is an elegant approach to say the least.

Let $\overrightarrow{OA} = a$, $\overrightarrow{OB} = b$, $\overrightarrow{OC} = c$ and $\overrightarrow{OD} = d$

Firstly, compute $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = b - a = r_B\, e^{i\beta} - r_A\, e^{i\alpha} = \mathrm{R}e^{i\phi}$,

where $|b-a| = R$ and $\arg(b-a) = \phi$

Geometrically speaking, if we multiply the vector $\overrightarrow{AB}$ by a general complex number say $\ell e^{i\delta}$, then the magnitude of this vector will be **scaled** by ℓ units and **rotated** through δ radians. (clock-wise or anti-clock-wise depending on whether it is designated positive or negative)

So $\overrightarrow{AC} = \overrightarrow{AB}$ multiplied by $\frac{r_1}{R}\, e^{i\theta_1}$ $= \mathrm{R}e^{i\phi}$ multiplied by $\frac{r_1}{R}\, e^{i\theta_1}$ and

$\overrightarrow{AD} = \overrightarrow{AB}$ multiplied by $\frac{r_2}{R}\, e^{i\theta_2}$ $= \mathrm{R}e^{i\phi}$ multiplied by $\frac{r_2}{R}\, e^{i\theta_2}$

As such, we can now **attempt to solve** for complex numbers C and D by recognizing that

$\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AC} = a + c$ and $\overrightarrow{OD} = \overrightarrow{OA} + \overrightarrow{AD} = a + d$