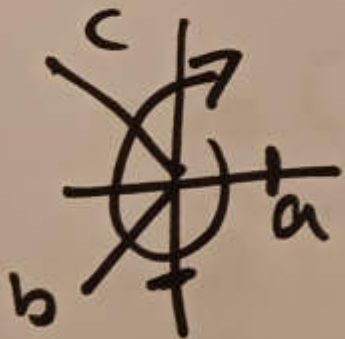


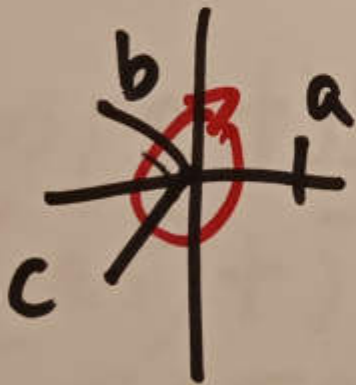
Always look clock-wise

abc
↓
positive
phase
sequence



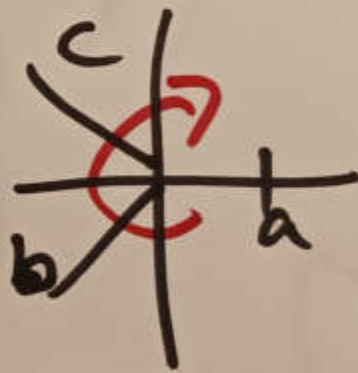
acb

↓
negative
phase
sequence

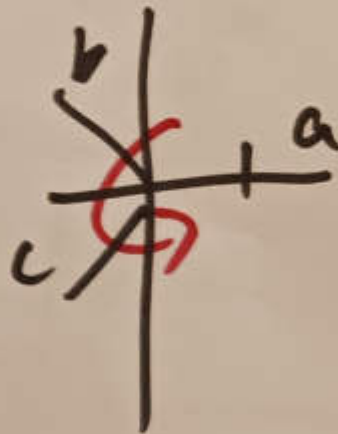


always look at abc

clock-wise
↓
positive
phase
sequence



consider
clock-wise
↓
negative
phase
sequence.



(2)

$$V_{ab} = [] V_a$$

$$= V_a \angle 0^\circ - V_a \angle -120^\circ$$

$$= V_a (\underline{\underline{\angle 0^\circ}} - \underline{\underline{\angle -120^\circ}})$$

$$= V_a (\underline{\underline{1 - \angle -120^\circ}})$$

$$= V_a (1 - (\cos -120^\circ + j \sin(-120^\circ)))$$

$$= V_a (1 - \cos 120^\circ + j \sin 120^\circ)$$

$$= V_a (1 - (-0.5) + j 0.866)$$

$$= V_a (1 + 0.5 + j 0.866)$$

$$= V_a (\underline{\underline{1.5 + j 0.866}})$$

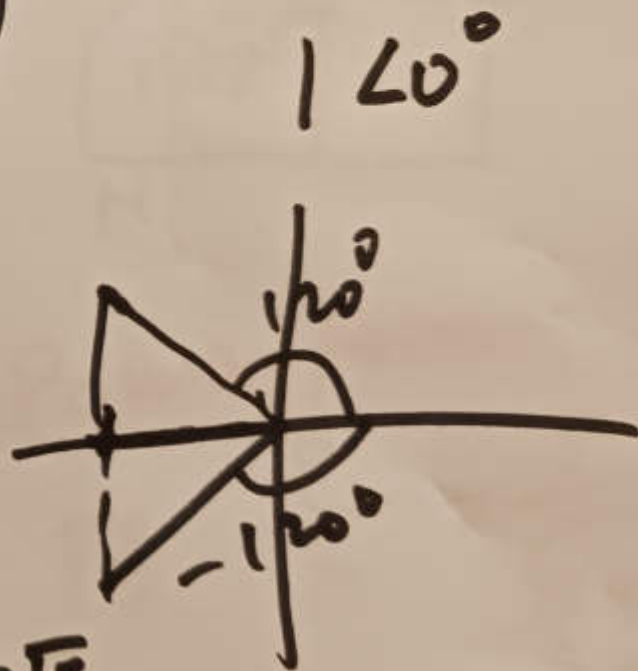
$$= V_a \cdot \underline{\underline{\sqrt{3} \angle 30^\circ}}$$

Euler:

$$Ae^{j\theta} = A(\underline{\underline{\cos\theta}} + j\underline{\underline{\sin\theta}})$$

phasor \rightarrow rectangular

$A \angle \theta$



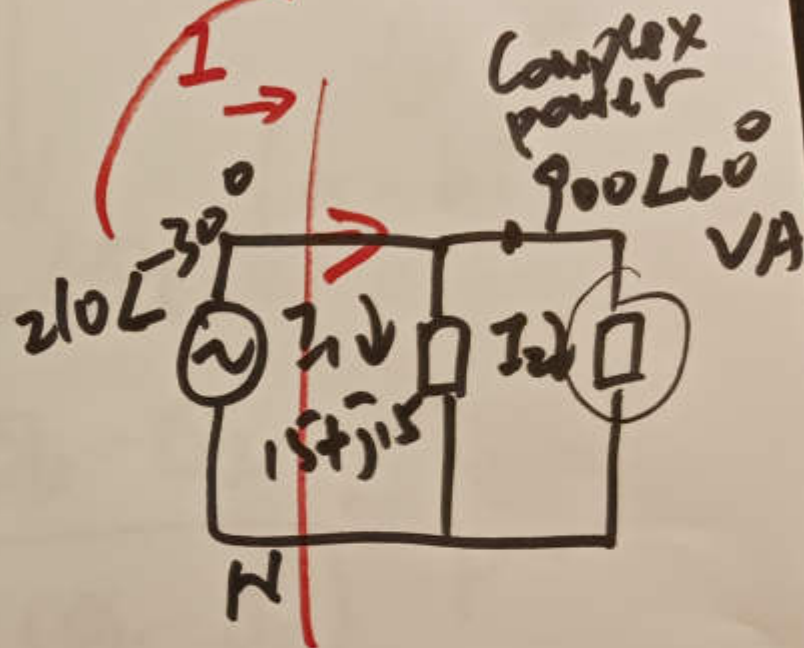
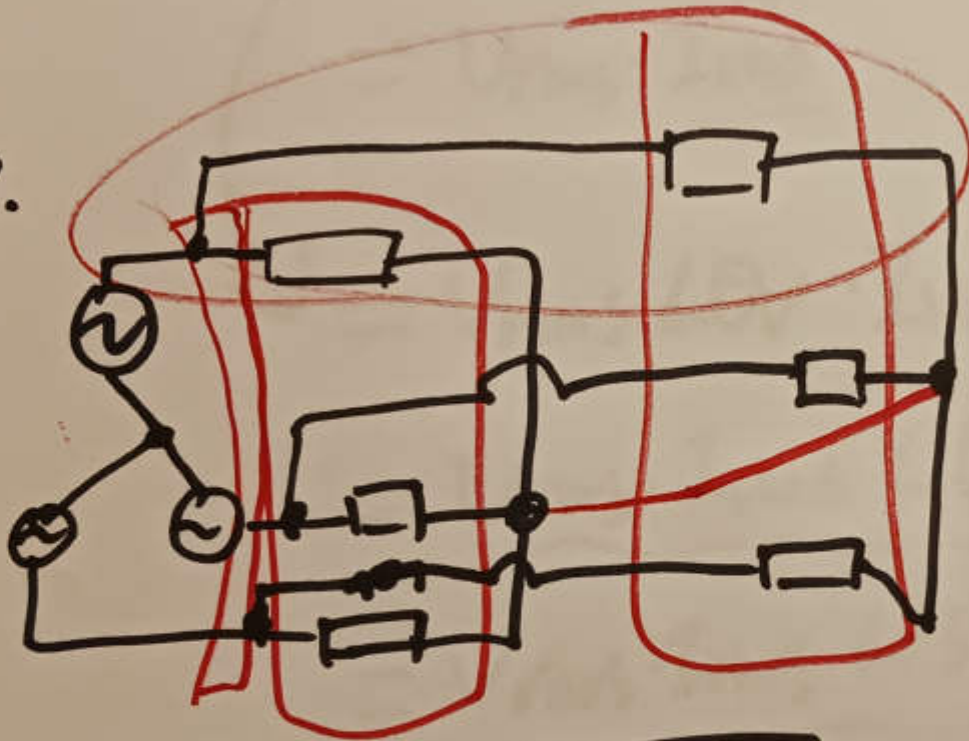
$$\underline{\underline{1.732 = \sqrt{3}}}$$

(3)

$$V_{ab} = \underbrace{\left(I_L \cdot \sqrt{216.25^2 + 65^2} \right)}_{V_a} \cdot \sqrt{3}$$

$$S_{Pa} = \frac{V_a \cdot I^*}{\Delta}$$

P11.24.



Apparent power $\rightarrow S = \sqrt{P^2 + Q^2}$

Complex power $\rightarrow S_{\text{complex}} = P + jQ$

Power factor:

$$P_f = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}}$$

$$\begin{aligned}
 S_{\text{complex}} &= V_{\text{rms}} \angle \theta_V \cdot I_{\text{rms}}^* \angle \theta_I \\
 &= \underline{V_{\text{rms}}} \cdot \underline{I_{\text{rms}}^*} \\
 &= V_{\text{rms}} \angle \theta_V \cdot I_{\text{rms}} \angle -\theta_I \\
 &= \underline{V_{\text{rms}} \cdot I_{\text{rms}} \angle \theta_V - \theta_I} \\
 &= \underline{V_{\text{rms}} \cdot I_{\text{rms}} \cos(\theta_V - \theta_I)} \quad P \\
 &\quad + j \underline{V_{\text{rms}} I_{\text{rms}} \sin(\theta_V - \theta_I)} \quad Q \\
 &= \underline{\cancel{V_{\text{rms}} I} P + j Q}
 \end{aligned}$$

$(a + bj)^*$
 \Downarrow
 $(a - bj)$

5

Total complex power by source

$$I_1 = \frac{210 \angle -30^\circ}{15 + j15}$$

$$S_{\text{complex}} = 900 \angle 60^\circ \text{ VA}$$

$$V \cdot I_2^* = S_{\text{complex}} = 900 \angle 60^\circ$$

$$I_2^* = \frac{900 \angle 60^\circ}{210 \angle -30^\circ} = \square \angle \cancel{90^\circ}$$

$$I_2 = \square \angle -\cancel{90^\circ}$$

$$\underline{I = I_1 + I_2 =}$$

$$S_a = \underline{V_a} \cdot \underline{I}^*$$

$$S_T = 3 \underline{V_a} \cdot \underline{I}^*$$

(b)