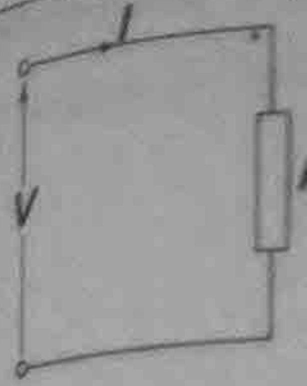
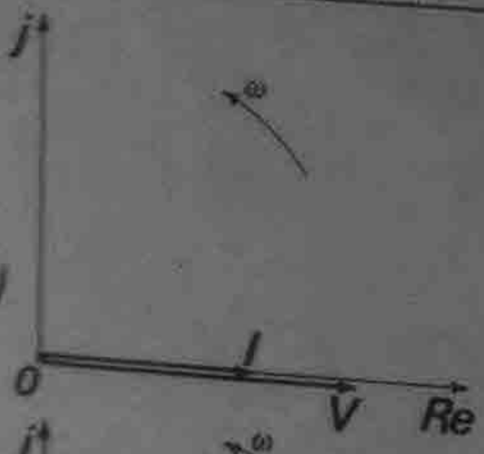
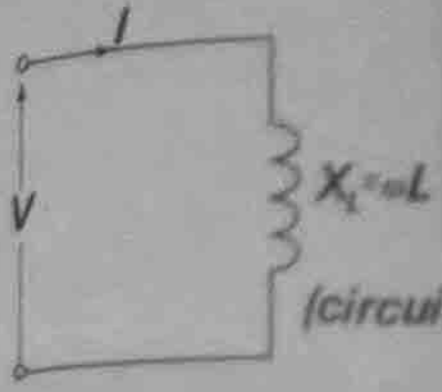


$V = RI$

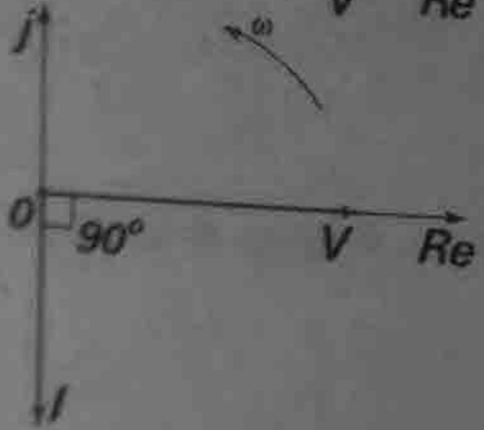
(circuito puramente ohmico)

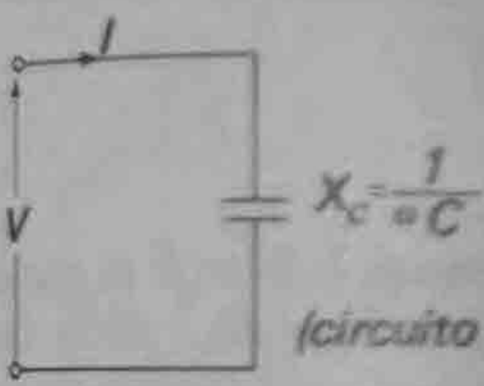




$V = jX_L I$

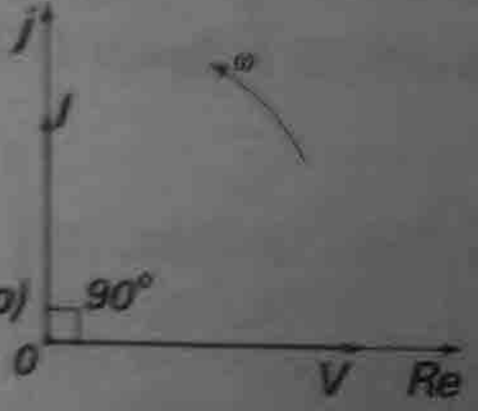
(circuito puramente induttivo)

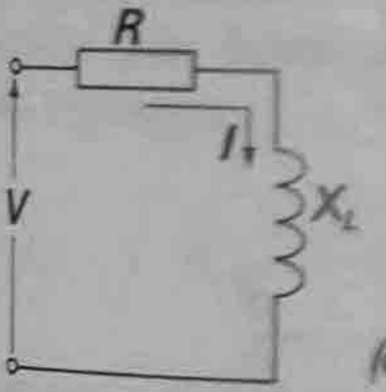




$V = -jX_C I$

(circuito puramente capacitivo)



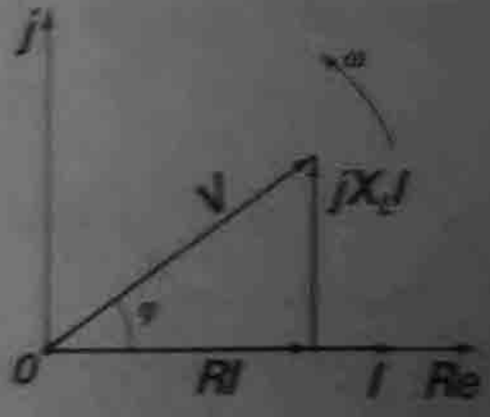


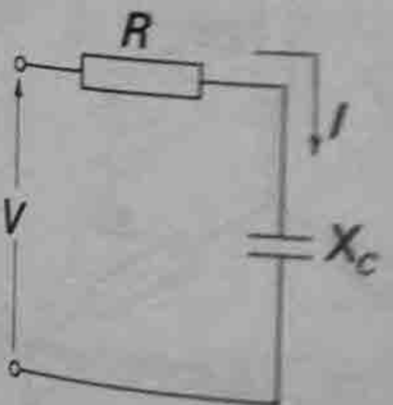
$Z = R + jX_L$

$V = (R + jX_L)I$

$tg\varphi = \frac{X_L}{R}$

(circito ohmico-induttivo)



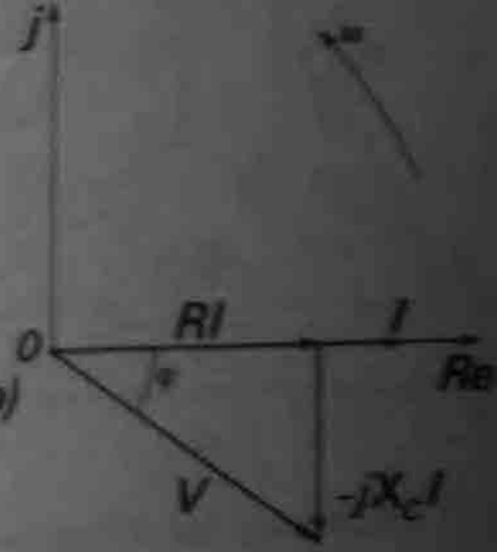


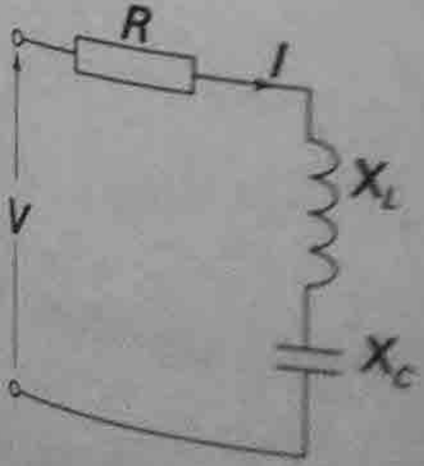
$Z = R - jX_C$

$V = -jX_C I$

$tg\varphi = \frac{-X_C}{R}$

(circuito ohmico-capacitivo)



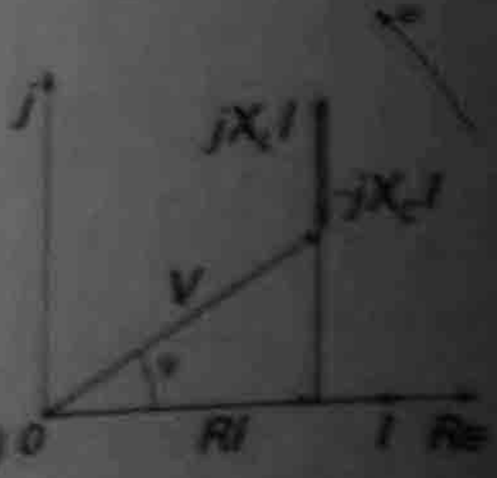


$Z = R + j(X_L - X_C)$

$V = [R + j(X_L - X_C) \cdot I]$

$tg\varphi = \frac{X_L - X_C}{R}$

(circuito R-L-C generico)



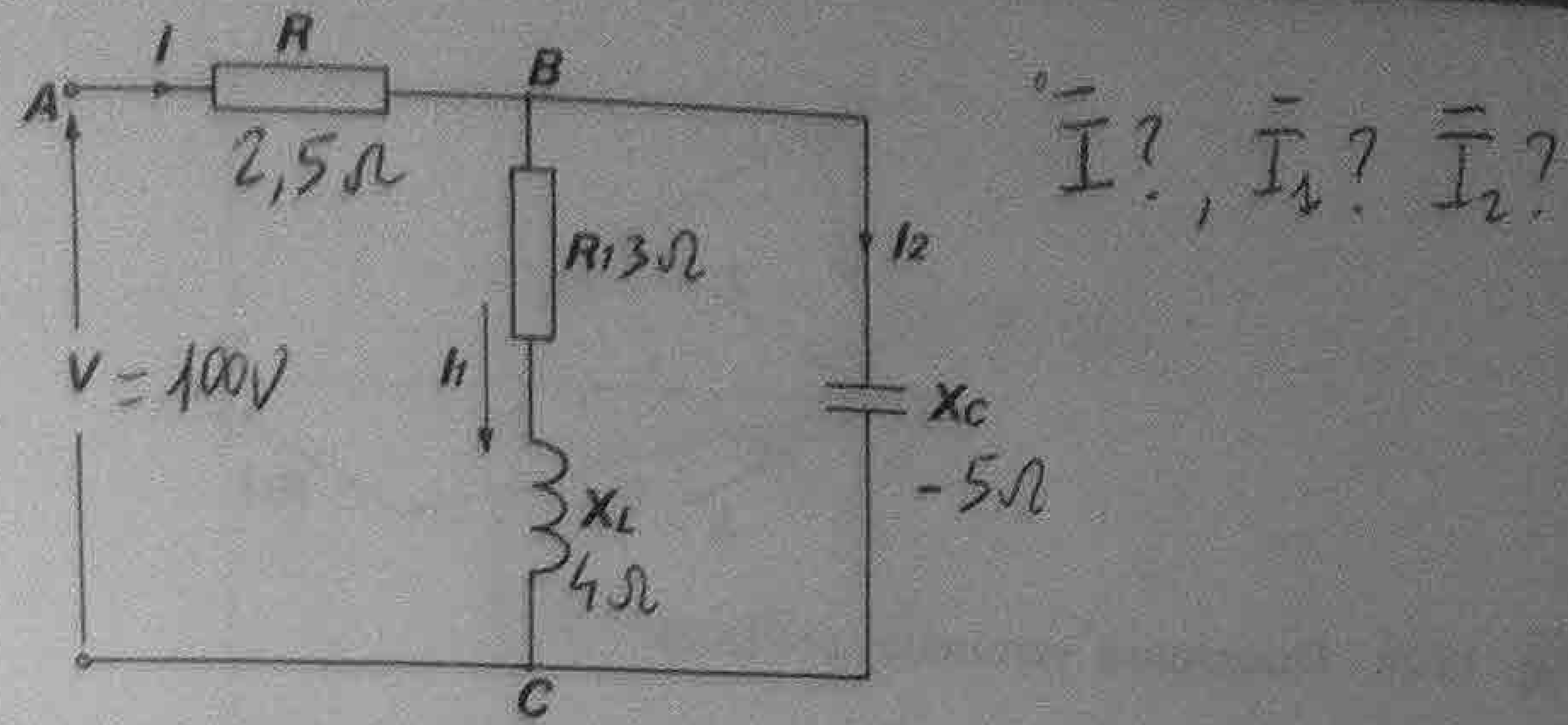


Fig. 15.26 - Circuito elettrico relativo all'esercizio 15.1.

Per la 15.73, l'impedenza totale $\mathbf{Z}_{AC}$ vale:

$$Z_{AC} = R + \mathbf{Z}_{BC} = 2{,}5 + 7{,}5 - j2{,}5 = 10 - j2{,}5\,(\Omega) = 10{,}3\,\Omega\underline{|-14{,}036^\circ}$$

Posto **V** sull'asse reale (vedi Fig. 15.27), la corrente totale **I** vale:

$$\mathrm{I} = \frac{\mathbf{V}}{\mathbf{Z}_{AC}} = \frac{100\,\underline{|0^\circ}}{10{,}3\,\underline{|-14{,}036^\circ}} = 9{,}7\,\mathrm{A}\underline{|+14{,}036^\circ} = 9{,}41 + j2{,}35\,(\mathrm{A})$$

Determinazione di I_1 e I_2: **primo modo.**
Per determinare la I_1, basta applicare le 15.76:

$$\mathrm{I}_1 = \mathbf{I}\cdot\frac{-jX_C}{R_1 + jX_L - jX_C} = (9{,}41 + j2{,}35)\cdot\frac{-j5}{3 + j4 - j5} = 15{,}34\,\mathrm{A}\underline{|-57{,}529^\circ} = 8{,}24 - j12{,}94\,(\mathrm{A})$$

Analogamente:

$$\mathrm{I}_2 = \mathbf{I}\cdot\frac{R_1 + jX_L}{R_1 + jX_L - jX_C} = (9{,}41 + j2{,}35)\cdot\frac{3 + j4}{3 + j4 - j5} = 15{,}34\,\mathrm{A}\underline{|85{,}6^\circ} = 1{,}18 + j15{,}3\,(\mathrm{A})$$

o, più semplicemente, per il primo principio di Kirchhoff nel nodo B:

$$\mathbf{I}_2 = \mathbf{I} - \mathbf{I}_1 = 9{,}41 + j2{,}35 - (8{,}24 - j12{,}94) = 1{,}17 + j15{,}29 = \\ = 15{,}34\,\mathrm{A}\underline{|85{,}6^\circ}$$

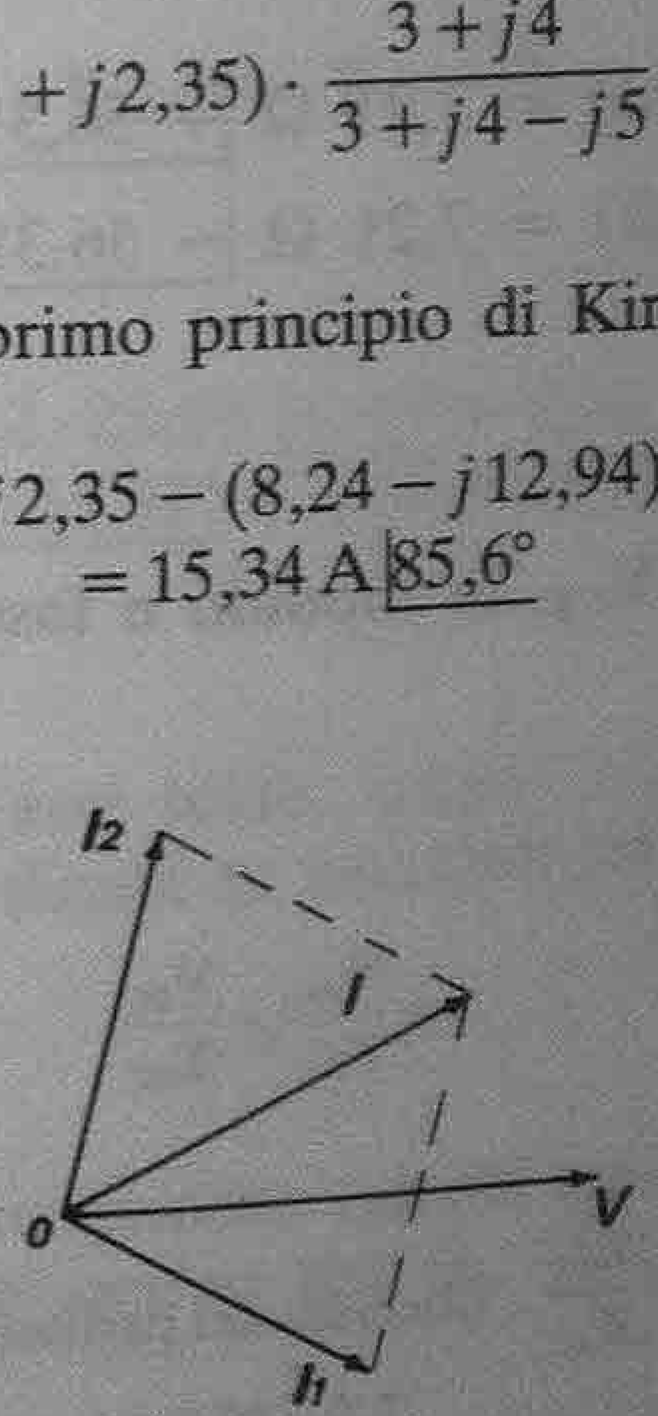


Fig. 15.27 - Diagramma vettoriale (es. 15.1).

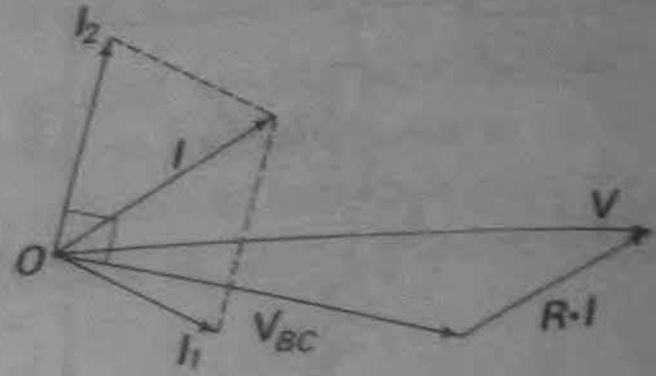


Fig. 15.28 - Diagramma vettoriale (es. 15.1).

Determinazione di $\mathbf{I}_1$ e $\mathbf{I}_2$: secondo modo.
Per la 9.49 si ha

$$\mathbf{V}_{AC} = \mathbf{V}_{AB} + \mathbf{V}_{BC}$$

da cui (vedi Fig. 15.28):

$$\mathbf{V}_{BC} = \mathbf{V}_{AC} - \mathbf{V}_{AB} = \mathbf{V} - R \cdot \mathbf{I} = 100 - 2{,}5 \cdot (9{,}41 + j2{,}35) = \\ = 76{,}475 - j5{,}875\,(\mathrm{V}) = 76{,}7\ \mathrm{V}\,\underline{|-4{,}39^\circ}$$ (20)

Quindi:

$$\mathbf{I}_1 = \frac{\mathbf{V}_{BC}}{R_1 + jX_L} = \frac{76{,}475 - j5{,}875}{3 + j4} = \frac{76{,}7\,\underline{|-4{,}39^\circ}}{5\,\underline{|53{,}13^\circ}} = 15{,}34\ \mathrm{A}\,\underline{|-57{,}52^\circ}$$

$$\mathbf{I}_2 = \frac{\mathbf{V}_{BC}}{-jX_C} = \frac{76{,}7\,\underline{|-4{,}39^\circ}}{5\,\underline{|-90^\circ}} = 15{,}34\ \mathrm{A}\,\underline{|+85{,}61^\circ}$$