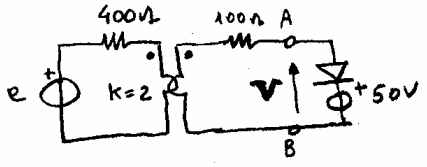
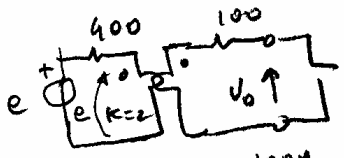
COGNOME (IN STAMPATELLO)	NOME	MATRICOLA	ELETTROTECNICA 1 14 luglio-2005 2^ appello	
	DOCENTE:			

Per ogni esercizio riportare sia il risultato che il procedimento utilizzato (utilizzare solamente questo foglio, che va riconsegnato al termine della prova).

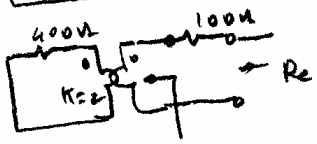
1) **a)** Rappresentare secondo **Thevenin** il bipolo a ***sinistra*** dei terminali A e B indicati.
b) Tracciare il grafico quotato uscita-ingresso della tensione di uscita v (in volt) rispetto alla tensione di ingresso e (in volt).



a)

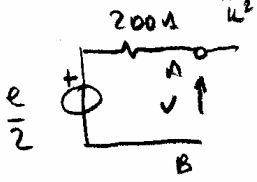


$V_0 = \frac{e}{K} = \frac{1}{2}e$

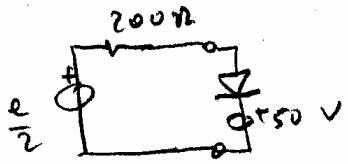


$R_e = \frac{400}{K^2} + 100 = 200\,\Omega$

$\frac{400}{K^2} = 100\,\Omega$



b)



$\frac{e}{2} > 50$ ON

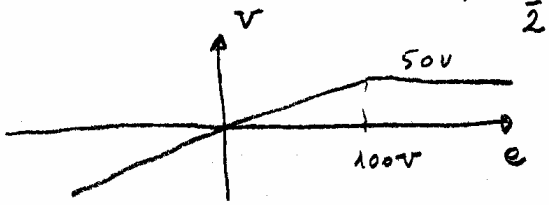
$V = 50\,V$

$\frac{e}{2} < 50$ OFF

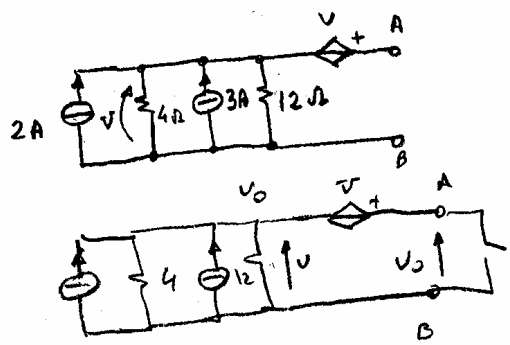
$V = \frac{e}{2}$

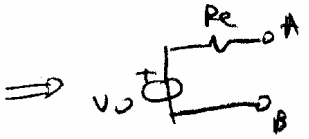
$\frac{e_0}{2} = 50$

$e_0 = 100\,V$



2) Calcolare l'equivalente Thevenin del bipolo di morsetti a-b.

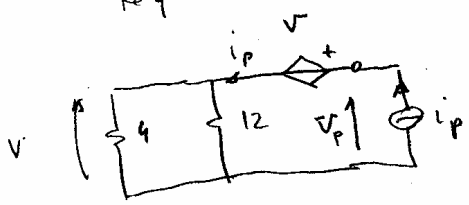




$V = (2+3) \cdot 4 \| 12 = 5 \cdot \frac{48}{16} = 15$ volt

$V_0 = 2V = 30$ volt

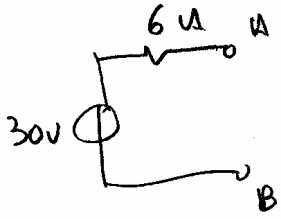
Req



$V = 4 \| 12 \cdot i_p = 3 i_p$

$V_p = V + V = 2V = 6 i_p$

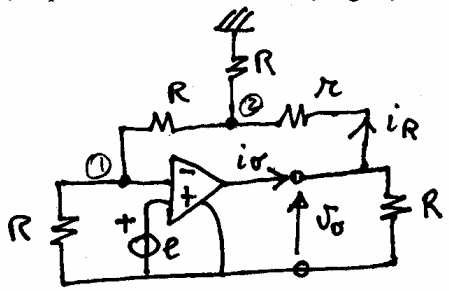
$Re = \frac{V_p}{i_p} = 6\ \Omega$



3) Esprimere:

a) la tensione v_o, la corrente i_R e la corrente i_o;

b) la potenza elettrica uscente (erogata) dall'amplificatore operazionale ideale.



nel caso $r = \frac{1}{3} R$

METODO NODI

① $\frac{V_1}{R} + \frac{V_1 - V_2}{R} = 0$

② $\frac{V_2 - V_1}{R} + \frac{V_2}{R} + \frac{V_o - V_2}{r} = 0$

$V_- = V_+ \rightarrow V_1 = e$

$\frac{e}{R} + \frac{e}{R} - \frac{V_2}{r} = 0$

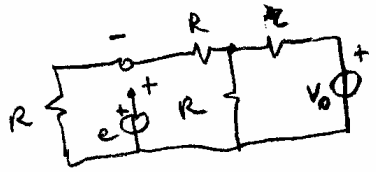
$V_2 = 2e$

$\frac{2e - e}{R} + \frac{2e}{R} + \frac{V_2 - V_o}{r} = 0$

$\frac{V_o}{r} = \frac{3e}{R} + \frac{2e}{r}$,

$V_o = \left(\frac{3r}{R} + 2\right) e$

METODO ALTERNATIVO



$V_- = \frac{1}{2} \frac{R \| (2R)}{R \| (2R) + r} V_o = e$

$\frac{1}{2} \frac{\frac{2}{3} R}{\frac{2}{3} R + r} V_o = e$

$\frac{R}{2R + 3r} V_o = e \rightarrow V_o = \left(2 + 3\frac{r}{R}\right) e$

$P = v_o i_o$

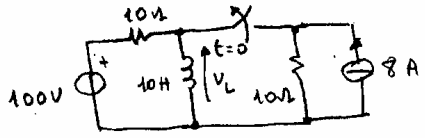
$V_o = (2+1)e = 3e$

$i_o = i_R + \frac{V_o}{R} = \frac{V_o - V_2}{r} + \frac{V_o}{R} =$

$= 3\frac{e}{R} + \frac{3e}{R} = \frac{6e}{R}$

$P = 3e \cdot \frac{6e}{R} = \frac{18 e^2}{R}$

4) La rete in figura è a regime prima della apertura dell'interruttore. L'interruttore si **apre** nell'istante t=0. Calcolare e disegnare qualitativamente la tensione $v_L(t)$ prima e dopo l'apertura dell'interruttore.

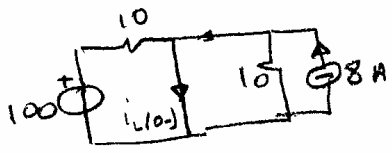


$t=0^-$ $\quad V_L = 0$

$t>0$ $\quad V_L = \left(V_L(0^+) - V_{Lp}\right) e^{-\frac{t}{\tau}} + V_{Lp}$

$V_{Lp} = 0$ $\quad \tau = \frac{L}{R} = 1\ sec$

$t=0^-$



$i_L(0-) = \frac{100}{10} + 8 = 18\ A$

$t=0^+$

$V_L(0^+) = 100 - 18 \cdot 10 = -80\ V$

$V_L(t) = -80\, e^{-t}$