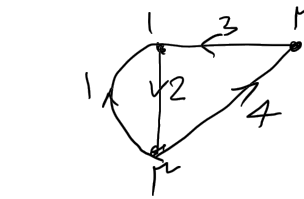
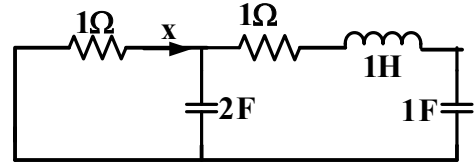
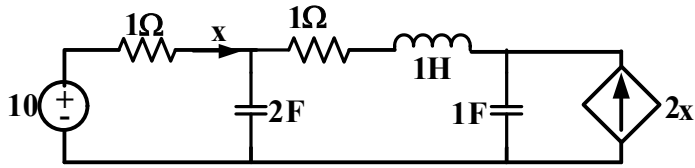
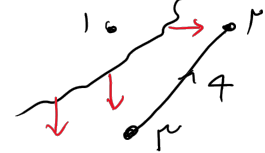


۱- باید ابتدا منابع را صفر کرده و سپس گراف را رسم کنیم.

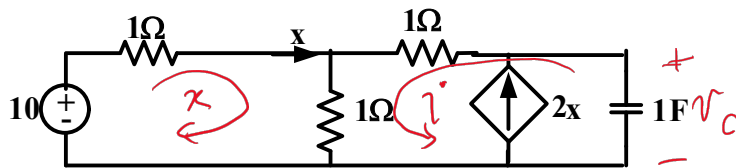


$$Q = \begin{bmatrix} -1 & 1 & -1 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix}$$



ترتیب شاخه ها: ۱۲۳۴

۲- کلید S در $t < 0$ باز بوده و هیچ منبع مستقلی وجود ندارد. پس: $v_C(0^-) = 0$



$$\begin{cases} 1X + 1(X + I) = \frac{10}{s} \\ 1I + 1(X + I) - V_C = 0 \end{cases}, V_C = \frac{1}{Cs} (2X - I) - \frac{v_C(0^-)}{s} = \frac{1}{s} (2X - I), \begin{cases} 2X + I = \frac{10}{s} \\ X + I - \frac{1}{s} (2X - I) = 0 \end{cases} \rightarrow$$

$$\begin{cases} 2X + I = \frac{10}{s} \rightarrow I = \frac{10}{s} - 2X \\ (1 - \frac{2}{s})X + (\frac{1}{s} - 2X) = 0 \end{cases} \rightarrow (1 - \frac{2}{s})X + (\frac{1}{s} - 2X) = 0 \rightarrow (1 - \frac{2}{s} - \frac{2}{s})X = -\frac{10}{s}(\frac{1}{s} - 2) \rightarrow$$

$$X = \frac{10(2s + 1)}{s(3s + 4)} = \frac{10}{3} \frac{2s + 1}{s(s + \frac{4}{3})} = \frac{A}{s} + \frac{B}{s + \frac{4}{3}} \rightarrow A = \lim_{s \rightarrow 0} sX = \lim_{s \rightarrow 0} \frac{10}{3} \frac{2s + 1}{s + \frac{4}{3}} = \frac{25}{4},$$

$$B = \lim_{s \rightarrow -\frac{4}{3}} (s + \frac{4}{3})X = \lim_{s \rightarrow -\frac{4}{3}} \frac{10}{3} \frac{2s + 1}{s} = \frac{25}{6} \Rightarrow x(t) = \frac{25}{4} + \frac{25}{6} e^{-\frac{4}{3}t}$$