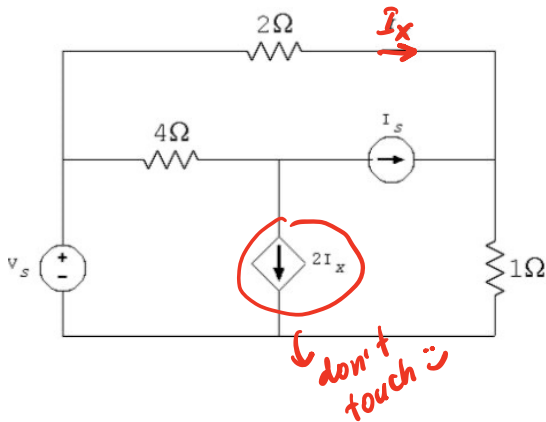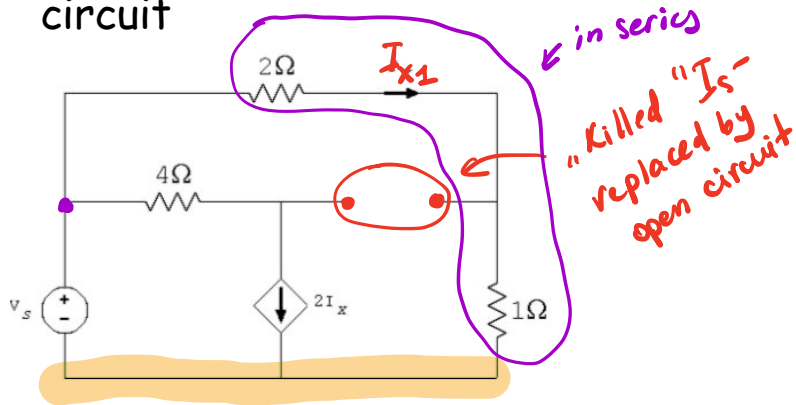- Example #8-cont: Use superposition to determine I_x in this circuit

1) Keep V_S

2) Keep I_S

- Example #8-cont: Use superposition to determine I_x in this circuit

2Ω I_{x1} ← in series

"Killed "I_s" replaced by open circuit

4Ω

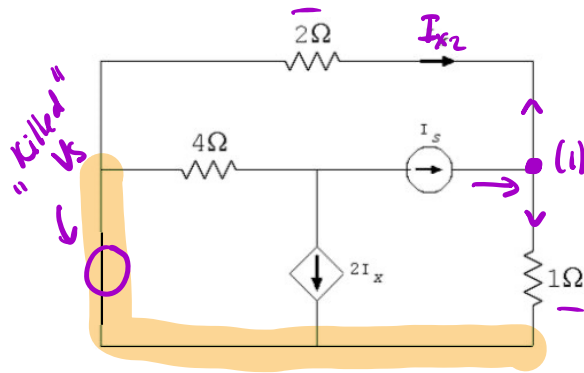V_s $2I_x$ 1Ω

$I_{x_1} - ?$

a) 0

b) V_s

c) $\frac{1}{3} V_s$

d) $\frac{2}{3} V_s$

V_s is in parallel with series of 2Ω and 1Ω =>

$I_{x_1} = \dfrac{V_s}{2+1} = \dfrac{1}{3} V_s$ => contribution to I_x from V_s.

- Example #8-cont: Use superposition to determine I_{x_2} in this circuit

"Killed" $V_s \rightarrow$ replace by short-circuit

2Ω and 1Ω are in parallel $\Rightarrow$
can do current division,

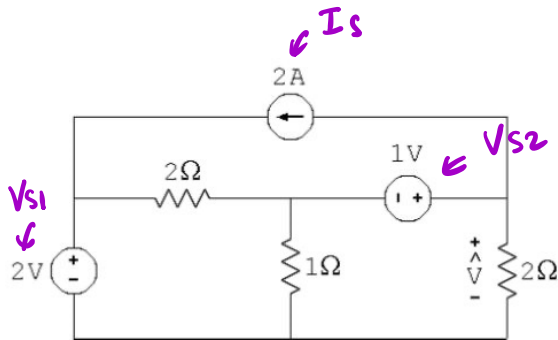$$-I_{x_2} = I_s \left(\frac{1}{1+2}\right) \Rightarrow$$

need to take $-I_{x_2}$, since I_{x_2} is coming into the node (1)

$$I_{x_2} = -\frac{1}{3} I_s \quad \text{- contribution from } I_s$$

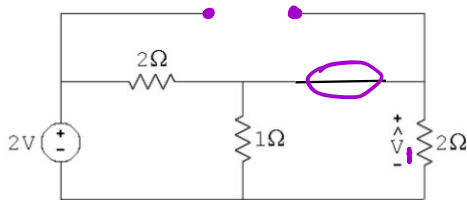$$\Rightarrow \quad I_x = I_{x_1} + I_{x_2} = \frac{1}{3} V_s - \frac{1}{3} I_s$$

- Example #9: Use superposition to determine $\hat{V}$ in this circuit
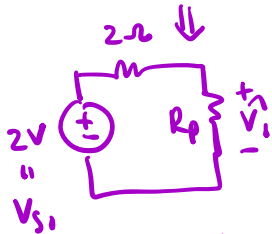
$$\hat{V} = k_1 V_{S1} + k_2 I_S + k_3 V_{S2}$$

- Example #9-cont: Use superposition to determine $\hat{V}_1$ in this circuit

$$\frac{1\cdot 2}{1+2} = \frac{2}{3}\,\Omega$$

in parallel $\Rightarrow R_p = \frac{1\cdot 2}{1+2} = \frac{2}{3}\,\Omega$

2Ω

R_p

$\overset{+}{\underset{-}{\hat{V}_1}}$

$2V$ "V_{S_1}"

contribution from 2V source

$\downarrow$ Voltage division: $\hat{V}_1 = V_{S_1}\left(\dfrac{2/3}{2/3 + 2}\right) = \dfrac{1}{4}\cdot V_{S_1} = \dfrac{1}{2}\,V$

$\underbrace{}_{R_1}$

39

- Example #9-cont: Use superposition to determine $\hat{V}_2$ in this circuit

Keep only 2A source:

node (1)

R_1
2Ω

$-\hat{V}_2 +$ $+\hat{V}_2 -$ $1\Omega\ R_2$ $\overset{+}{\underset{-}{V_2}}\ 2\Omega\ R_3$

node (2)

KCL @ (2): $2 = I_{R_1} + I_{R_2} + I_{R_3}$

$$-\frac{\hat{V}_2}{R_1} - \frac{\hat{V}_2}{R_2} - \frac{\hat{V}_2}{R_3} = 2$$

$$\hat{V}_2 = -1V$$

contribution from 2A source

40