Lecture 7, Friday, January 28, 2022

- Superposition principle: Let $\mathbf{V_{s_1}}, \mathbf{V_{s_2}}, \ldots, \mathbf{V_{s_n}}, \mathbf{I_{s_1}}, \mathbf{I_{s_2}}, \ldots, \mathbf{I_{s_m}}$ be the complete set of *independent* sources in a resistive circuit. Then, any electrical response $\mathbf{y}$ in the circuit (voltage or current) can be expressed as

$$\mathbf{y} = \mathbf{k_1}\mathbf{V_{s_1}} + \mathbf{k_2}\mathbf{V_{s_2}} + \cdots + \mathbf{k_n}\mathbf{V_{s_n}} + \hat{\mathbf{k}}_\mathbf{1}\mathbf{I_{s_1}} + \hat{\mathbf{k}}_\mathbf{2}\mathbf{I_{s_2}} + \cdots + \hat{\mathbf{k}}_\mathbf{m}\mathbf{I_{s_m}},$$

  where the constants $\mathbf{k_1}, \ldots \mathbf{k_n}, \hat{\mathbf{k}}_\mathbf{1}, \ldots \hat{\mathbf{k}}_\mathbf{m}$ are unique to each response $\mathbf{y}$.

  - Basically, can look at the effect of each source separately, and then add their contributions.
    * Remove independent voltage sources by short-circuiting them.
    * Remove independent current sources by open-circuiting them.
    * Always keep all the *dependent* sources.

