Test #3 Overview

Chapters covered
- The following chapters and sections in Electric Circuits, 9th Edition by Nilsson
  - Chapter 4, Sections 9 – 13 (Homework #5)
  - Chapter 6 (Homework #6)
- Related Homework Assignments: HW #7-9

Chapter 4 Topics (65 – 70%)
Real voltage sources and real current sources
- Models
- Characteristics
Source transformations
- Not always possible
- Be careful to protect important circuit variables
Superposition
- Applies to voltage and current, but not to power
- Kill independent sources by:
  - Shorting voltage sources
  - Opening current sources
- Never kill a dependent source
Thevenin’s and Norton’s theorems – 3 key methods:
  - Use source transformations to reduce the circuit into the form of a TEC or NEC
    - Not always possible
    - Not generally possible with dependent sources
  - Find \( R_{th} = R_{eq} \) (seen by the load with independent sources killed). Also find either \( V_{oc} \) or \( I_{sc} \).
  - Find \( V_{oc} \) and \( I_{sc} \) (most general method – always works).
Maximum power transfer theorem
- The first step is to find the TEC
- Max power occurs when \( R_L = R_{th} \)
- \[
  P_{max} = \frac{V_{th}^2}{4R_{th}}
\]

Chapter 6 Topics (30 – 35%)
Physical properties, construction, models, typical values, basic types, combinations, etc.
Key relationships for \( v, i, p, \) and \( w \)
- Use the relationships with mathematical functions or with graphs
2 key facts for capacitors:
  - Capacitor voltage cannot change instantaneously: \( v_c(0^+) = v_c(0^-) \)
  - Capacitors act like open circuits in steady-state
2 key facts for inductors:
  - Inductor current cannot change instantaneously: \( i_L(0^+) = i_L(0^-) \)
  - Inductors act like short circuits in steady-state
Circuit analysis using the key facts listed above.