Topics for Today:

- Announcements
  - Software: Matlab? Off-campus students may buy student ed.
  - Office hrs: x:05pm-x:55pm Mon,Wed; x:05-x:55 Friday
  - Grader office hrs: 4-6pm Mon and Wed Fri. EERC 123.
  - Office: EERC 614. Phone: 906.487.2857
  - XFMR exercises posted later today, due Fri 5pm (Mon 9am).
  - Recommended problems from Ch.2, solutions posted

- XFMR, Chapter 2 - Transformers and circuits w/transformers
  - Pre-Req Videos 3-6 - View them, study notes!
  - Single phase ideal transformer is building block - V, I, dot convention!
  - 3-phase transformer banks and phase shifts (ANSI/IEEE vs. IEC)
  - Standard 30°shift transformers, non-standard connections
  - Pos/neg sequence phase shifts, sequence networks.
  - Autotransformers
  - Load Tap Changing (LTC) transformers
  - Phase shifting transformers
  - Paralleling transformers with a) unlike impedances; b) unlike tap positions
  - Three-winding transformers
How many possibilities are there for $\Delta - y$ or $y - \Delta$ phase shifts?

6 each

$\equiv 12$ total.

\[ +30^\circ \quad +90^\circ \quad +150^\circ \]

Auto - 6

Extended \[ \Delta \]

$2i9 - 2i8$
Diagram showing electrical connections with symbols and labels. The diagram includes lines, points, and text annotations in a handwritten style. The symbols suggest a complex electrical system, possibly related to power distribution or circuitry.
Balanced 3-ph voltages:

\[ |\tilde{V}_{AG}| = |\tilde{V}_{BG}| = |\tilde{V}_{CG}| \]
A - y
Stl Phase Shift
\[ \frac{|V_1|}{|V_2|} = n = \frac{|I_{1c}|}{|I_{1}|} \]

\[ S_{cw} = V_1 I_1^* = V_2 I_2^* = S_{out} \]

**Polarity Marks:** "same" polarity

\[ \frac{\sqrt{V_1}}{\sqrt{V_2}} = \frac{\sqrt{I_1}}{\sqrt{I_2}} \]
Transformer Phase Shifts

- See Δ-Y transformer nameplate

Diagram with symbols and annotations.
3-PHASE XFMR BANKS

Ex: Δ-Y

△ - Y

X1 X2 X3

H1 H2 H3

(+)(-) (+)(-) (+)(-)

-30° -150° 90°

H1 H2 H3

X1 X2 X3

90° CCW

From: Review Lecture 5