

Lecture 8 - Supermeshes

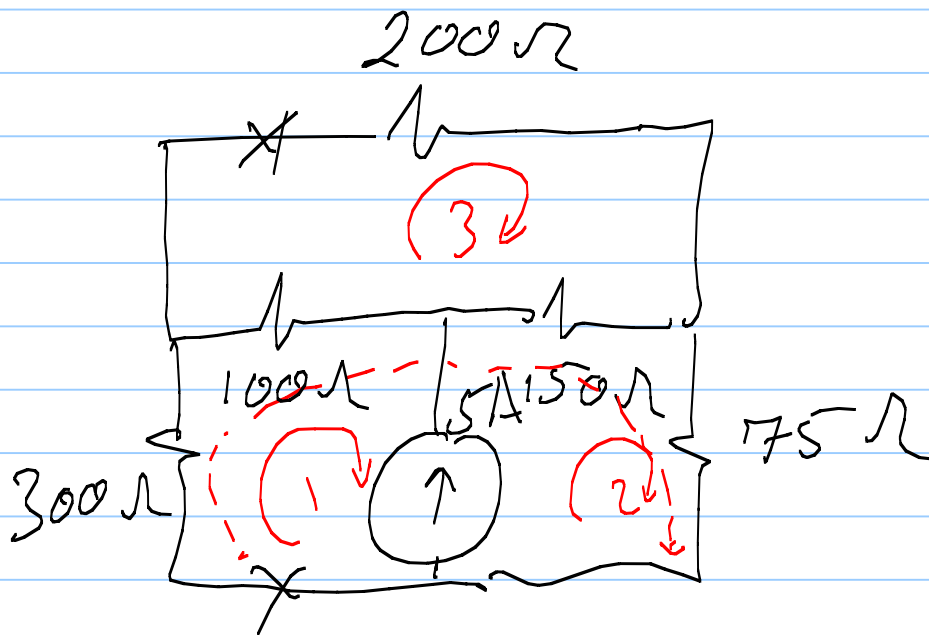
Note Title

9/30/2009

→ Rules for EE220 tests

- Open book
- 1 note page
- calc
- ~55min
- resubmissions

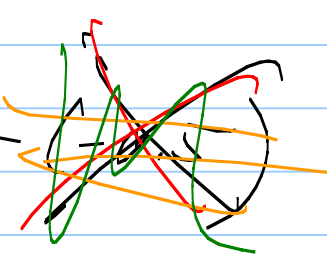
Supermesh



Mesh I analysis

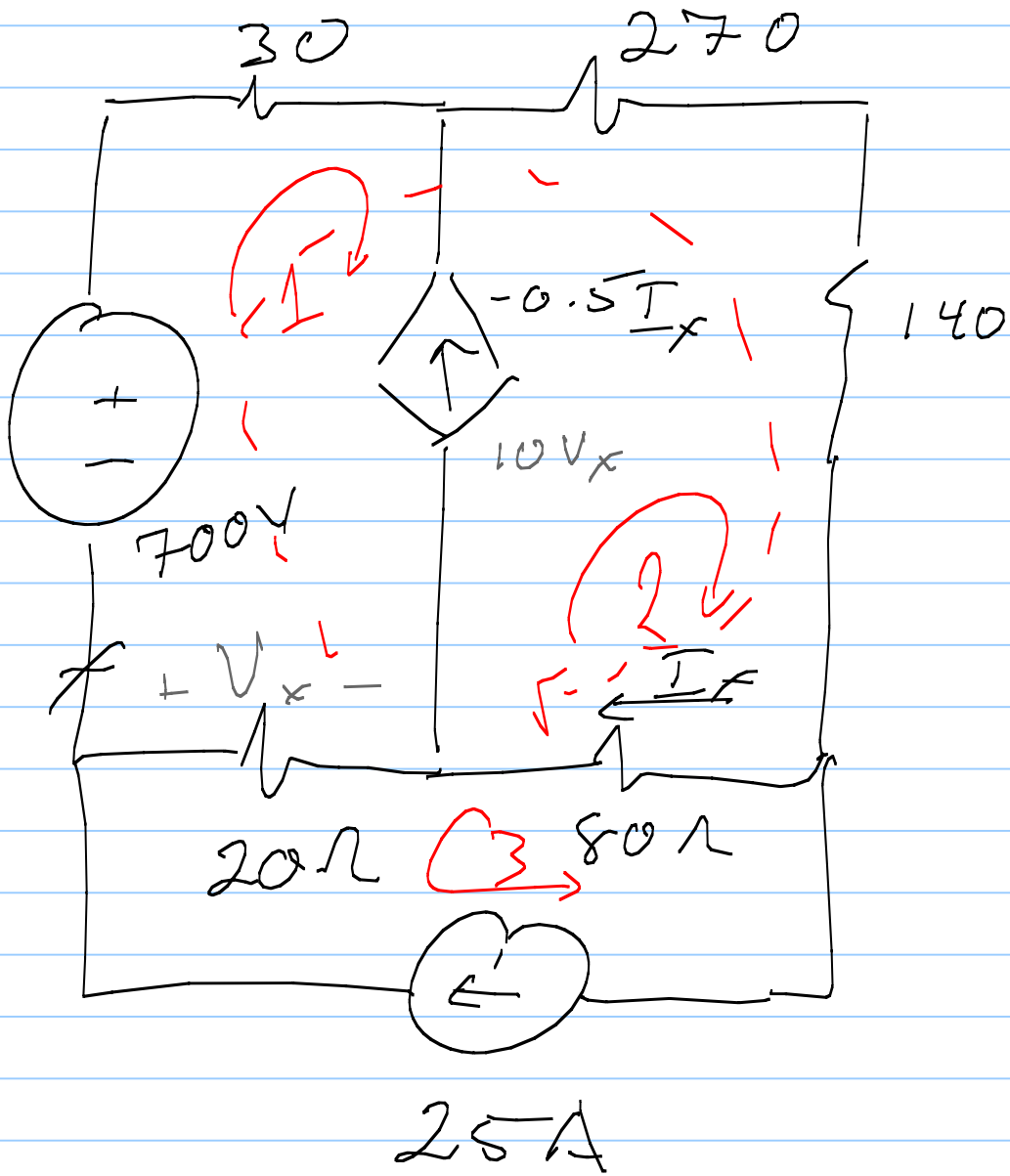
use KVL & Ohm
≡

Known: No known Mesh Currents

$$\text{KVL @ } \frac{1}{2}: 300I_1 + 100(I_1 - I_3) + \text{[Diagram]} \\ 300I_1 + 100(I_1 - I_3) + 150(I_2 - I_3) + 75I_2 = 0$$


$$\text{Supermesh: } I_2 - I_1 = 0.5$$

$$\text{KVL @ } 3: 200I_3 + 150(I_3 - I_2) + \\ 100(I_3 - I_1) = 0$$



$$\text{Known: } \underline{I}_3 = -25 \text{ A}$$

$$\text{KVL @ } 1/2: -700 + 30\underline{I}_1 + 270\underline{I}_2 + 140\underline{I}_2 \\ + 80(\underline{I}_2 + \underline{I}_3) + 20(\underline{I}_1 + \underline{I}_3) = 0$$

$$\text{Super: } -0.5\underline{V}_x = \underline{I}_2 - \underline{I}_1,$$

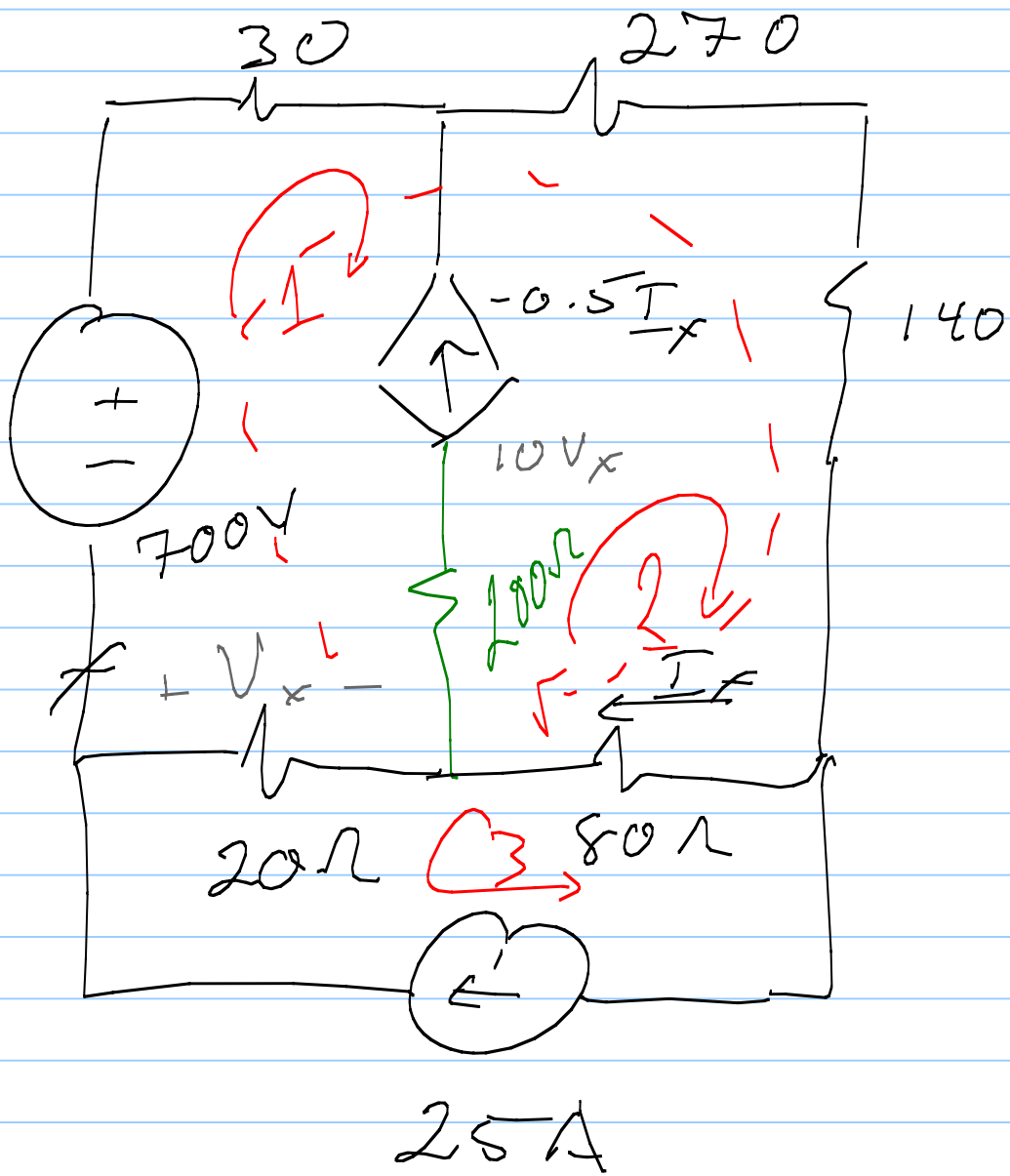
$$\text{Dep: } \underline{I}_x = \underline{I}_2 + \underline{I}_3$$

Known: same

$$\text{KVL @ } 1: -700 + 30\underline{I}_1 + 270\underline{I}_2 + 140\underline{I}_2 \\ + 80(\underline{I}_2 + \underline{I}_3) + 20(\underline{I}_1 + \underline{I}_3) = 0$$

$$\text{Super: } \underline{10 V}_x = \underline{I}_2 - \underline{I}_1,$$

$$\text{Dep: } \underline{V}_x = \underline{I} R = 20(\underline{I}_1 - \underline{I}_3) \\ -\underline{V}_x = 20(\underline{I}_1 + \underline{I}_3)$$



Known: $\bar{I}_3 = -25 \text{ A}$

KVL @ 1/2: $-700 + 30\bar{I}_1 + 270\bar{I}_2 + 140\bar{I}_2$
 $+ 80(\bar{I}_2 + \bar{I}_3) + 20(\bar{I}_1 + \bar{I}_2)$
 $= 0$

Super: $-0.5\bar{I}_y = \bar{I}_2 - \bar{I}_1$

Dep: $\bar{I}_x = \bar{I}_2 + \bar{I}_3$