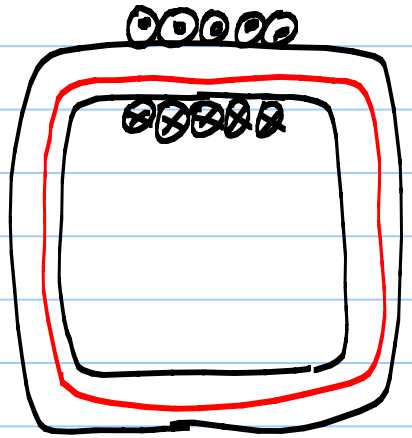
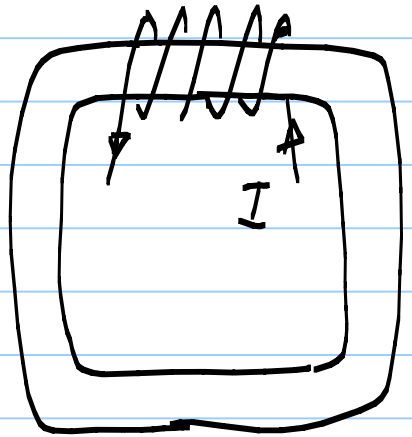
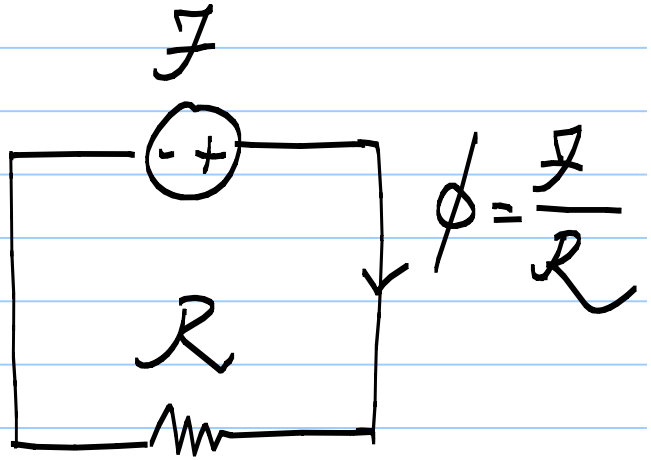
Lecture 40



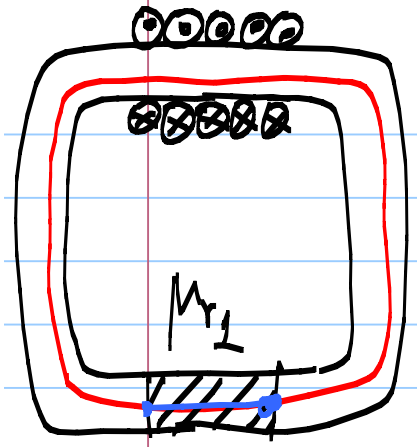
l_{loop}



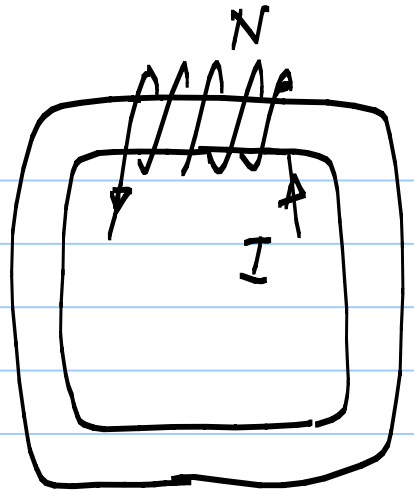


$$\phi = \frac{\mathcal{F}}{\mathcal{R}}$$

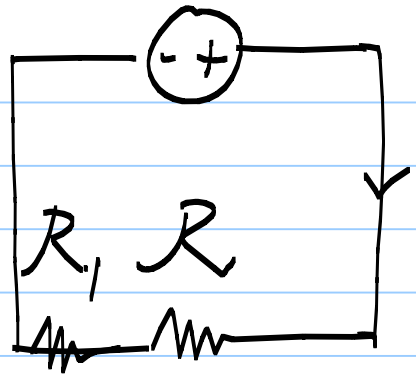
$$\frac{1}{\mathcal{P}} = \mathcal{R} = \frac{1}{\mu_r \mu_0} \cdot \frac{l_{loop}}{A}$$



l_{loop}



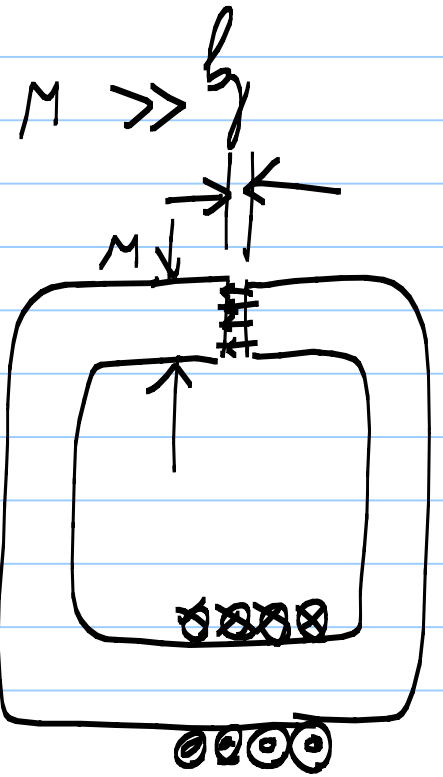
$$\mathcal{F} = N \cdot I = A \cdot turns$$

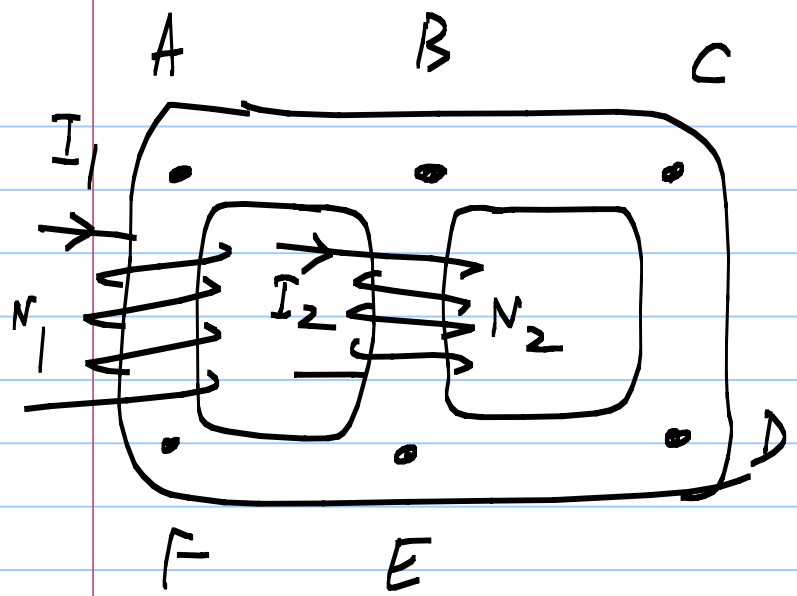


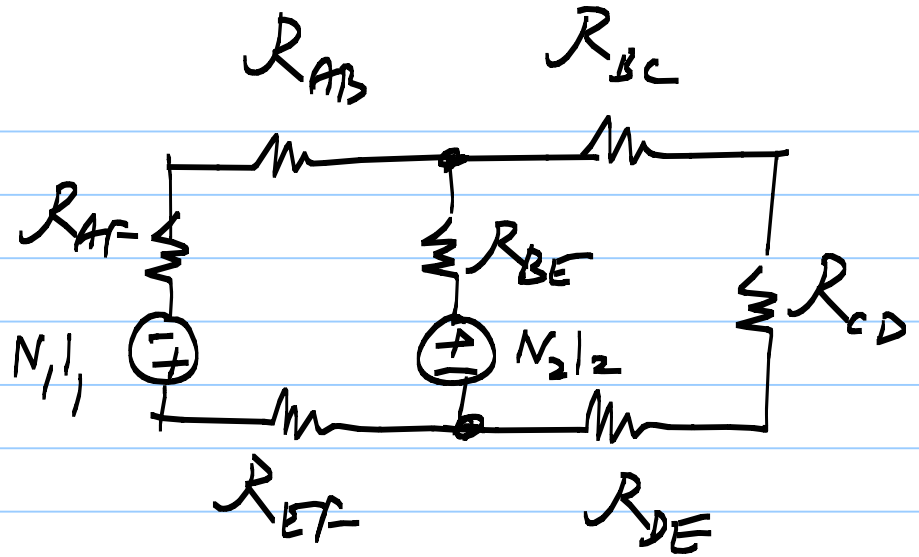
$$\phi = \frac{\mathcal{F}}{\mathcal{R}}$$

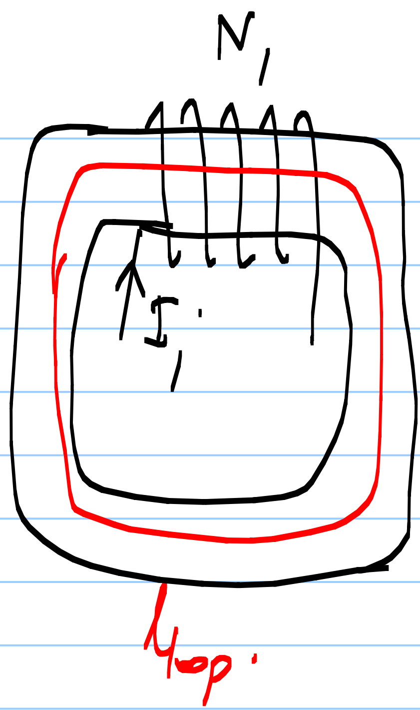
$$\mathcal{R} = \frac{1}{\mu_r \mu_0} \cdot \frac{l_{red}}{A}$$

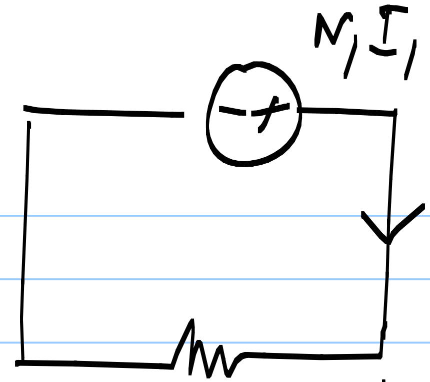
$$\mathcal{R}_1 = \frac{1}{\mu_r \mu_0} \cdot \frac{l_{blue}}{A}$$


M >> b
M


A
B
C
D
E
F
I_1
N_1
I_2
N_2


$\mathcal{R}_{AB}$
$\mathcal{R}_{BC}$
$\mathcal{R}_{AF}$
$\mathcal{R}_{BE}$
$\mathcal{R}_{CD}$
$N_1 I_1$
$N_2 I_2$
$\mathcal{R}_{EF}$
$\mathcal{R}_{DE}$





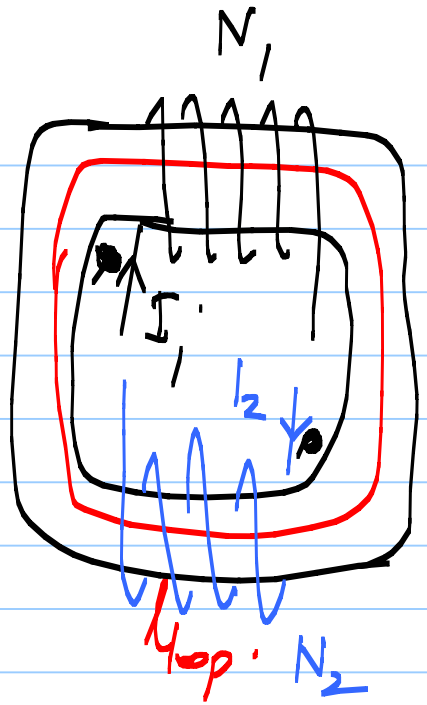
$$R = \frac{1}{P}$$

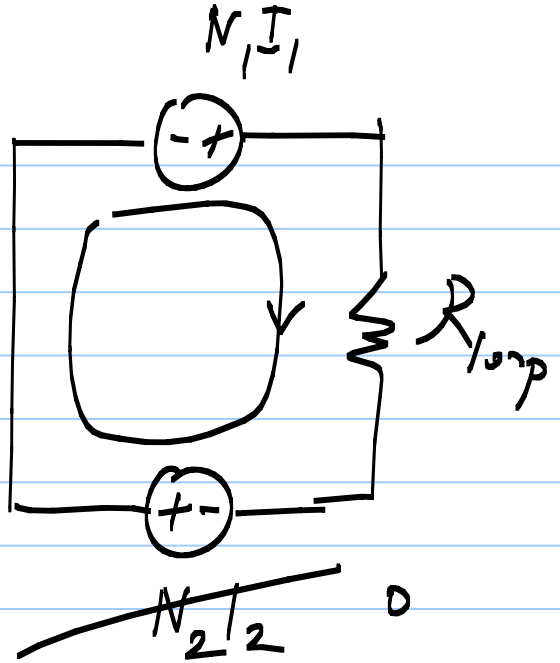
$$\phi = P \cdot N_1 I_1$$

$$P = \mu_r \mu_0 \cdot \frac{A}{l_{loop}}$$

$$\psi = N_1 \cdot \phi$$

$$= \underbrace{\mu_r \mu_0 \cdot \frac{N_1^2 A}{l_{loop}}}_{L} \cdot I_1$$





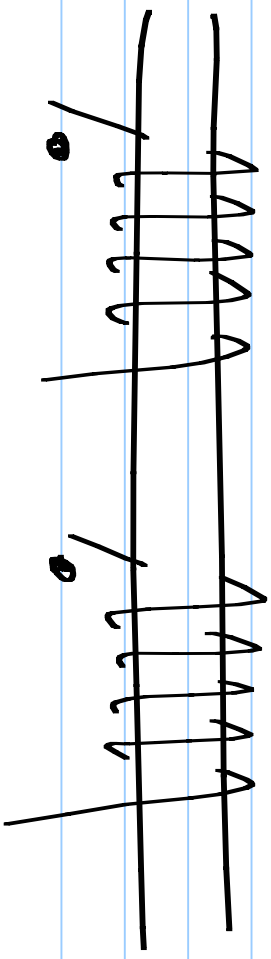
$N_1 I_1 \cdot \mathcal{P} \cdot N_2$

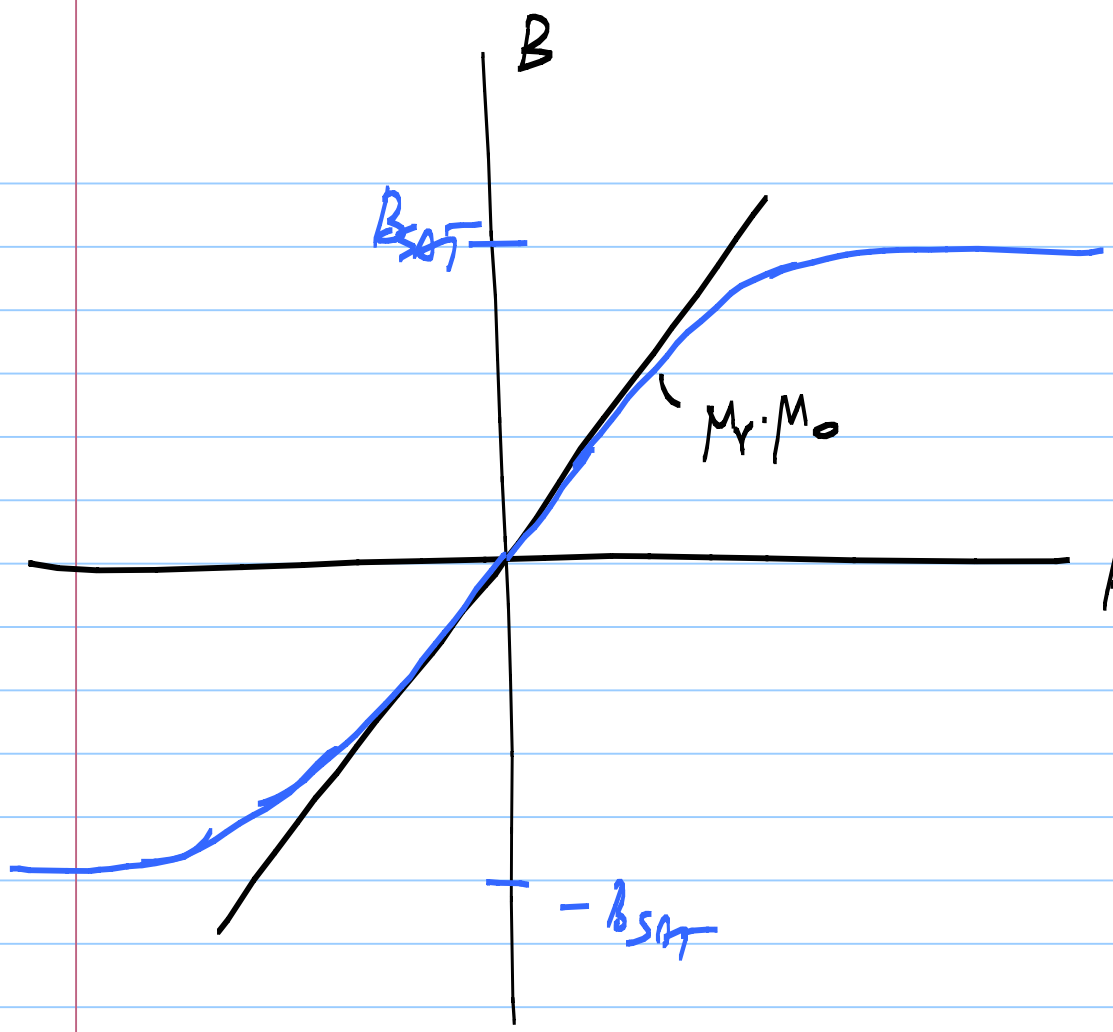
$$\frac{\psi_{21}}{I_1} = M_{21}$$

$$L_1 = \mu_r \mu_0 \frac{A}{l_{loop}} \cdot N_1^2$$

$$L_2 = \quad " \quad \cdot N_2^2$$

$$M = \mu_r \mu_0 \frac{A}{l_{loop}} \cdot N_1 N_2$$

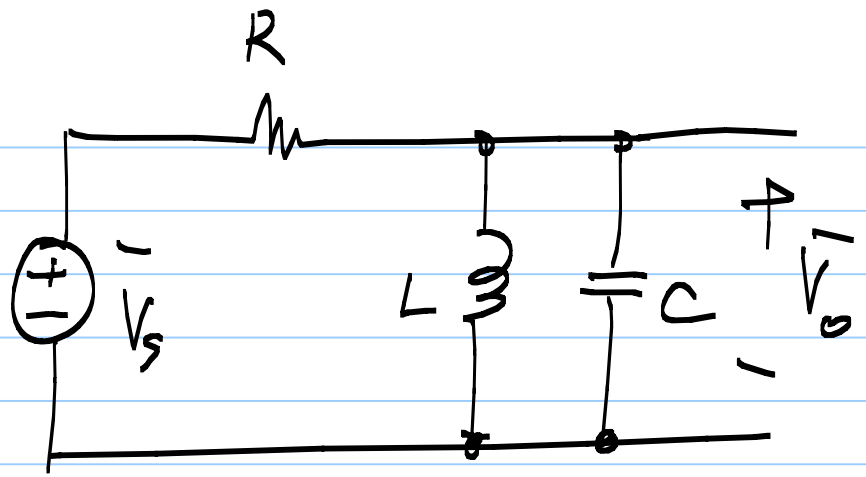


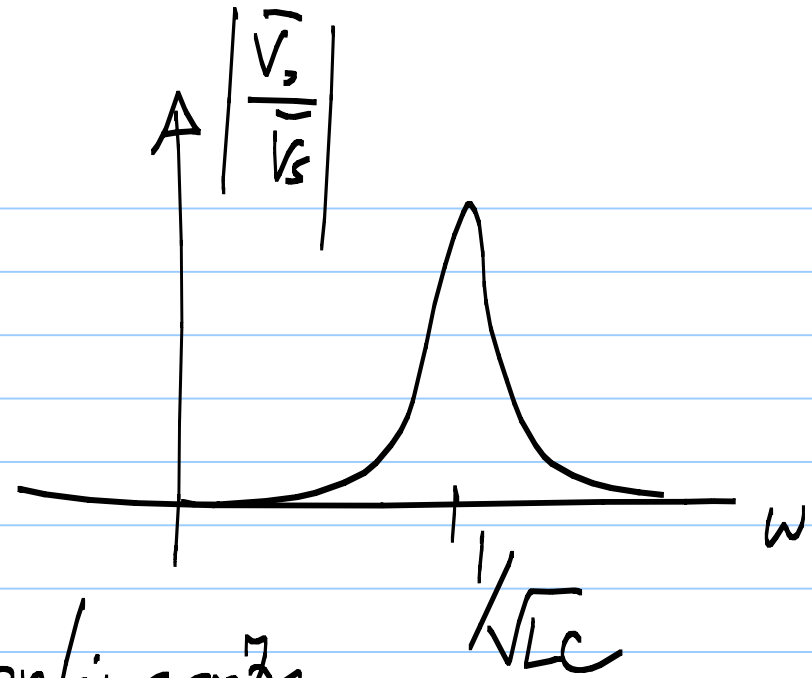


$$B = \mu_r \mu_0 \cdot H + \alpha_3 H^3 + \alpha_5 H^5 + \dots$$

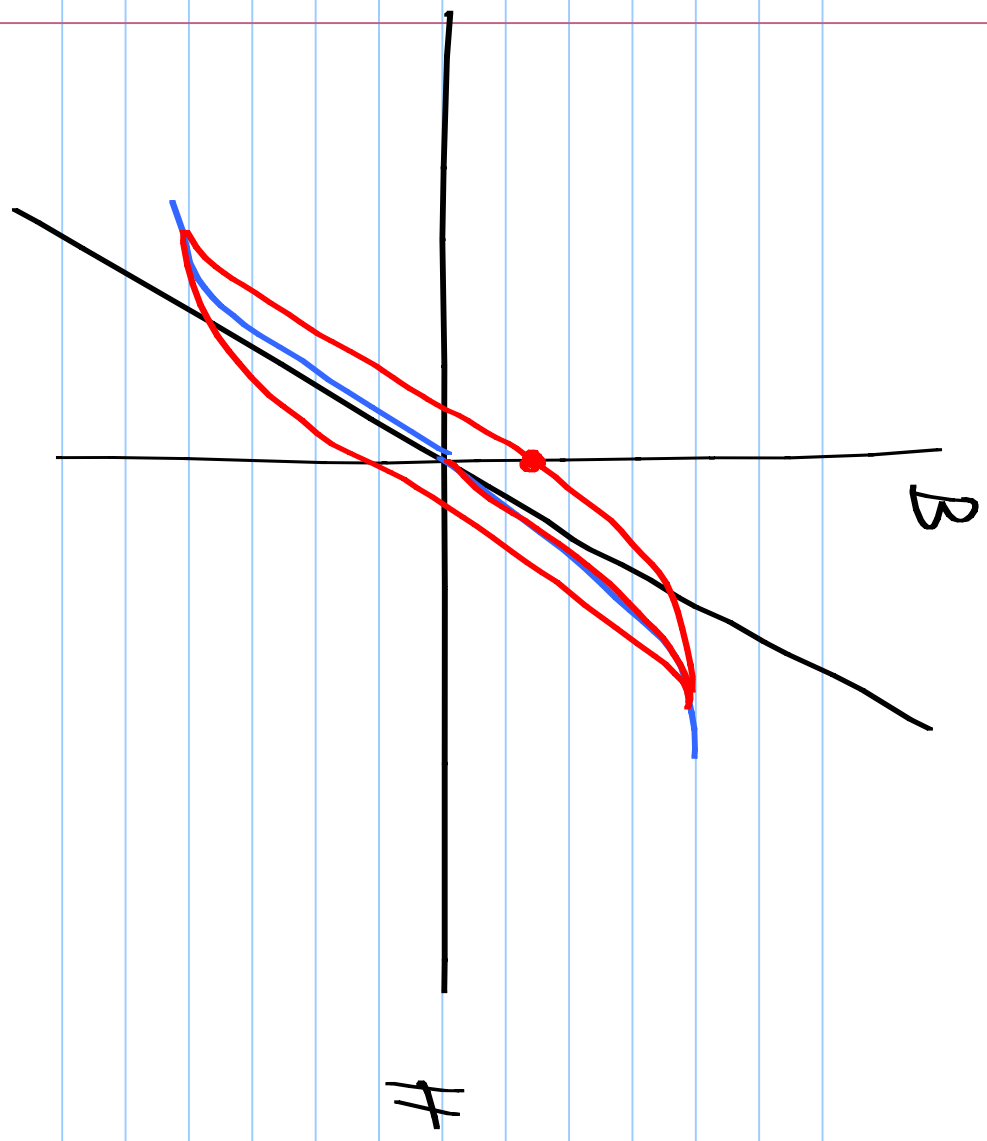
$H = N \cdot I$

$$B = \mu_r \mu_0 \cdot NI + \beta_3 I^3 + \beta_5 I^5 + \dots$$





Nonlinearity
- Soft nonlinearity
- Saturation


B
x