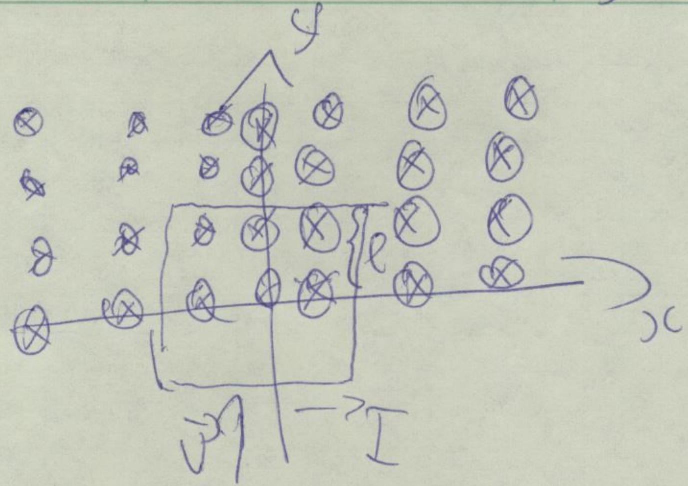
17.1.



Given

$$\Phi_N = N A_{(t)} B(t) = N B_{(t)} \omega v t = N(\gamma t^2) \omega v t^3$$

Faraday's Law

$$\Rightarrow emf = -\frac{d\Phi}{dt} = -\frac{d}{dt} N \gamma \omega v t^3 = -3 N \gamma \omega v t^2$$

Direction of I: flux into page and increasing generates a field to oppose the change

That field has to be out of page and through right hand Rule for wire

$\Rightarrow$ I flows in counterclockwise direction

17 a.

Given

$r = 10cm = 0.1m$

$N = 100$

$|\vec{B}| = 0.01T$

$f = \frac{20}{s}$

Find & Solution

$$\phi_m = N(\vec{B} \cdot \vec{n})A$$
$$= NBA \cos \omega t$$

where $\omega = 2\pi f$

Faraday's law

$$emf = -\frac{d\phi_m}{dt} = NBA\omega \sin \omega t$$

Peak emf

$$emf_{max} = NBA\omega = N|\vec{B}|\pi r^2 (2\pi f)$$
$$= 100(0.01T)\pi(0.1m)^2(2\pi)\frac{20}{s}$$

$$emf = 3.9V$$