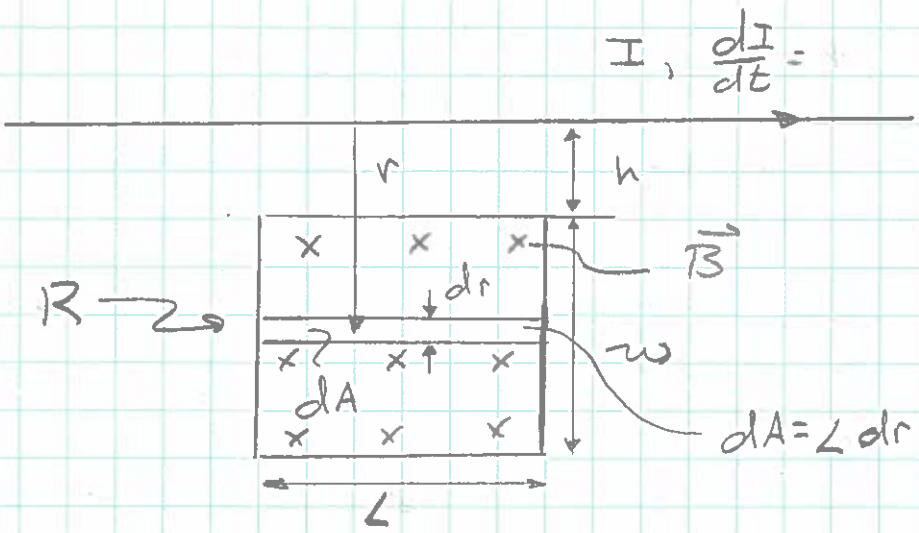

find the current induced in the loop

Faraday's law: $\mathcal{E} = \left| \frac{d\Phi_m}{dt} \right|$

Now, $B = \frac{\mu_0 I}{2\pi r}$ is not constant, but is ⊥ loop.

a.) $\Phi_m = \int \vec{B} \cdot d\vec{A} = \int B\, dA = \int B L\, dr$

So:

$$\Phi_m = \int_h^{w+h} \frac{\mu_0 I}{2\pi r} L\, dr = \frac{\mu_0 I L}{2\pi} \int_h^{w+h} \frac{dr}{r}$$

$$\Phi_m = \frac{\mu_0 I L}{2\pi} \ln(r) \Big|_h^{w+h} = \underline{\frac{\mu_0 I L}{2\pi} \ln\left(\frac{w+h}{h}\right)}$$

b.) $$\mathcal{E} = \left| \frac{d\Phi}{dt} \right| = \frac{\mu_0 L}{2\pi} \ln\left(\frac{w+h}{h}\right) \left| \frac{dI}{dt} \right|$$

and,

$$I_{in} = \frac{\mathcal{E}}{R} = \underline{\frac{\mu_0 L}{2\pi R} \ln\left(\frac{w+h}{h}\right) \left| \frac{dI}{dt} \right|}$$

c.) For $\frac{dI}{dt} > 0$, Flux is <u>increasing</u>

$\Rightarrow \vec{B}_{in}$ is OUT ⊙ $\Rightarrow$ <u>I_{in} is CCW</u>