| NAME: | Quiz #2d: |
| Solution | Phys270 |

1. [10 pts] A solenoid has N turns, a radius R_{sol}, a total length L, and a current I_{sol}. The solenoid depicted below is a cross sectional view.
   a. [1 pt] Draw the direction of the magnetic field inside the solenoid.
   b. [5 pts] What is the magnetic flux produced by the solenoid on a concentric circular loop of radius "a"?

$$\mu_0 \frac{N}{L} \cdot I_{sol} \cdot \pi R_{sol}^2$$

$\underbrace{}$ # of turns per ut. length

$\underbrace{\pi R_{sol}^2}$ Area.

Since the magnetic field outside the solenoid is zero, the area is not πa^2, but πR_{sol}^2

Also, the number of turns per unit length is N/L.

   c. [4 pts] If I_{sol} is decreasing, what is the direction of the induced current in the loop? Explain you reasoning.
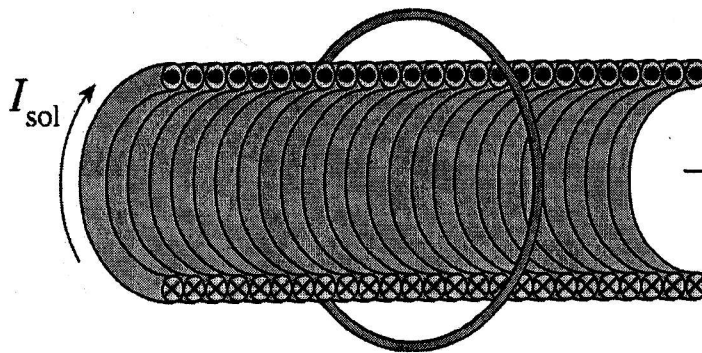
I_{sol} $\rightarrow$ λ clockwise as seen from left.

(a) From RHR, the $\vec{B}$ must point to right

(c) Since I_{sol} decreases, the flux decreases, so the induced current I_i must try to reinforce the flux and hence must be directed such as to give a $\vec{B}_i$ to right. By RHR, then, I_i must be clockwise as seen from left, or, it must be in the same sense as I_{sol}