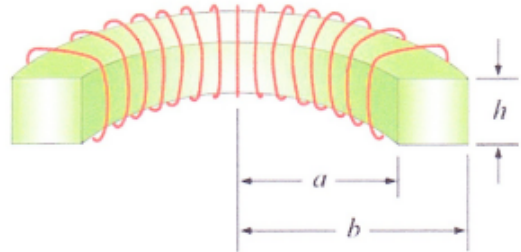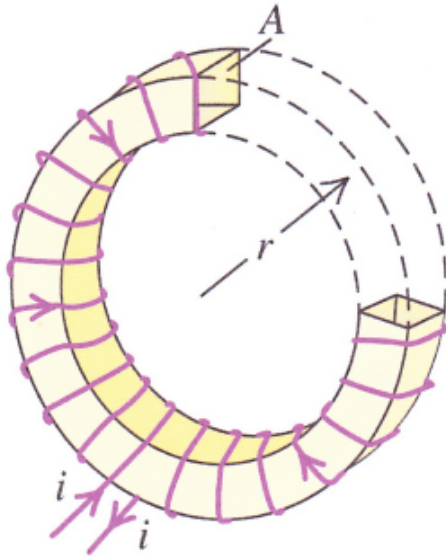1. **Previous Midterm** *(by Prof. Simon).* The figure below schematically illustrates a complete toroid with a rectangular cross-section. The wire is wound in N loops.

a) Find the magnetic field B(r) inside the toroid, $a \leq r \leq b$. [**5 points**]

b) What is the magnetic flux through each winding in the toroid? [**5 points**]

c) What is the self-inductance L of the toroid? [**5 points**]

d) What is the magnetic *energy density*, u_B, inside the toroid? [**5 points**]

e) Integrate the magnetic energy density over the volume to get the magnetic energy U_B stored in the toroid. Express your answer in terms of the self-inductance L and the current I. [**5 points**]

2. Compare the equation for charge motion in an LC circuit with the equation of motion of a mass on a spring. Can you spot an analogy? Predict what role the circuit's resistance would play. [**8 points**]