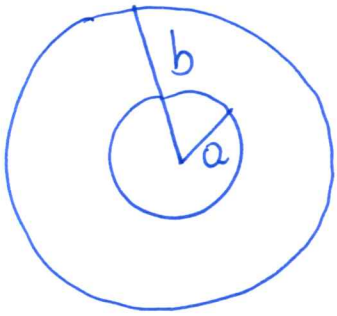
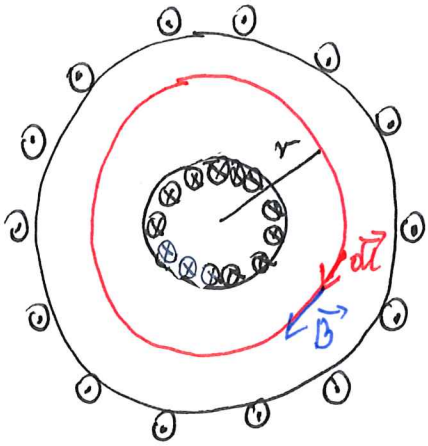
B - field of a toroid





$a < r < b$

$\oint \vec{B} \cdot d\vec{l} = \mu_0 i_{incl}$

$\vec{B} \parallel d\vec{l}$

B is constant for a given r

$B \int_0^{2\pi r} dl = B \cdot (2\pi r)$

$i_{incl} = N \cdot i$

i - current in a single loop

N = # loops

$B \cdot (2\pi r) = \mu_0 N \cdot i$

$$B = \frac{\mu_0 N i}{2\pi r}$$

inside (within the core)

$a < r < b$

For $r > b$ net current = 0

$B = 0$

equal number of positive & negative currents

& $r < a$ no current