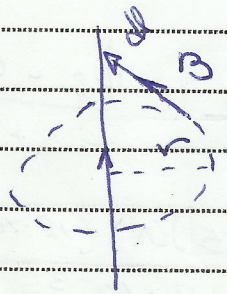
29.7

Datos

$\frac{di}{dt}$

i



Aplicar la ley de Ampere

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

1

$$\int |B||dl|\cos 0 = \mu_0 i$$

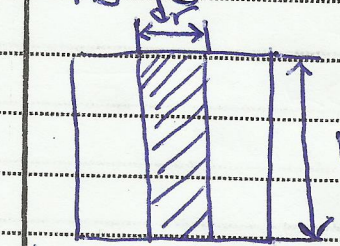
Donde l es la longitud del contorno amperiano.

$$B\int dl = \mu_0 i$$

$$Bl = \mu_0 i \Rightarrow B 2\pi r = \mu_0 i$$

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

$$\phi_B = \int \vec{B}\cdot d\vec{A} = \int |B||dA|\cos\theta$$



asumiendo $\vec{dA}$ entrando en el plano de la hoja $\theta = 0$

$$\boxed{d\phi_B = B\cdot dA = \frac{\mu_0 i}{2\pi r} L\,dr}$$

$d\phi = \frac{\mu_0 i}{2\pi r} L\,dr$ el total sería $\phi_B = \int_a^b \frac{\mu_0 i L}{2\pi r} dr$

$$\phi_B = \frac{\mu_0 i L}{2\pi}\int_a^b \frac{dr}{r} = \frac{\mu_0 i L}{2\pi}\ln b - \frac{\mu_0 i L}{2\pi}\ln a$$

$$\boxed{\phi_B = \frac{\mu_0 i L}{2\pi}\ln(b/a)}$$

derivando ϕ con respecto a t

$$\boxed{\mathcal{E}_i = -N\frac{d\phi}{dt} = -\frac{\mu_0 L}{2\pi}\ln(b/a)\frac{di}{dt}}$$