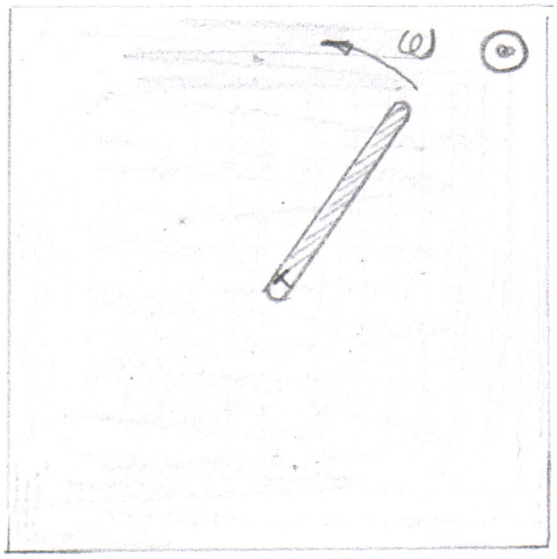
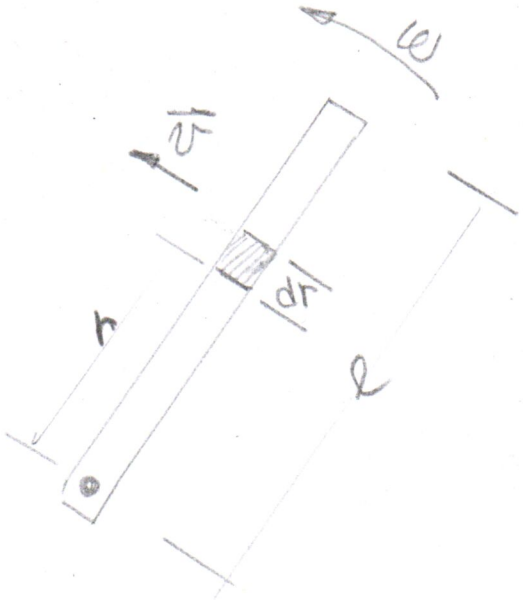
29.3



B saliente

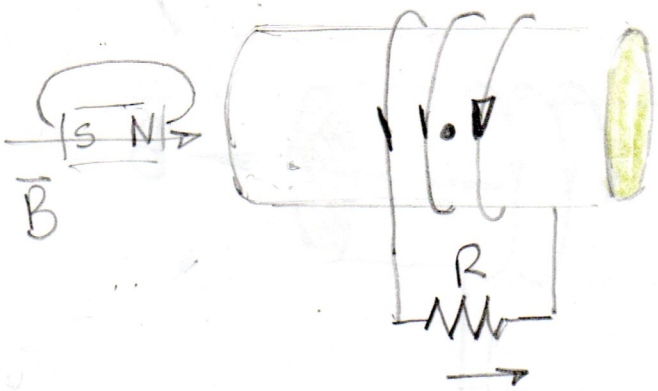


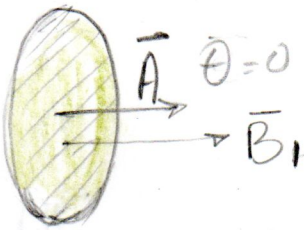
$v = r.\omega$

$$d\mathcal{E} = \|B\| \, \|\vec{v}\| \, dr \quad = \|B\| \int_0^{\ell} \|v\| dr = \|B\| \, \omega \int_0^{\ell} r \, dr$$

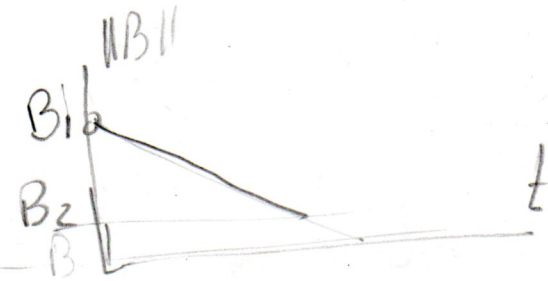
$$\mathcal{E} = \frac{1}{2} \|\vec{B}\| \, \omega \, \ell^2 \; (V)$$

30.1 a)





S o N
1



$$\Phi_1 = \int \vec{B}_1 \cdot d\vec{A} = \|\vec{B}_1\| \cdot \|\vec{A}\|$$

S o M
2

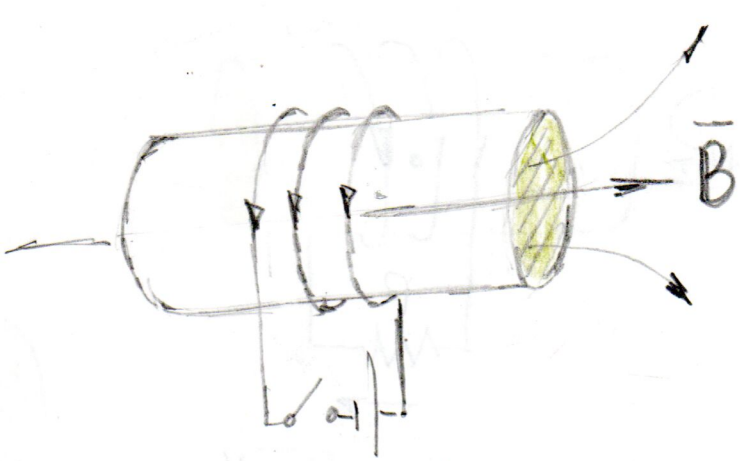
$$\Phi_2 = \int \vec{B}_2 \, d\vec{A} = \|\vec{B}_2\| \, \|\vec{A}\|$$

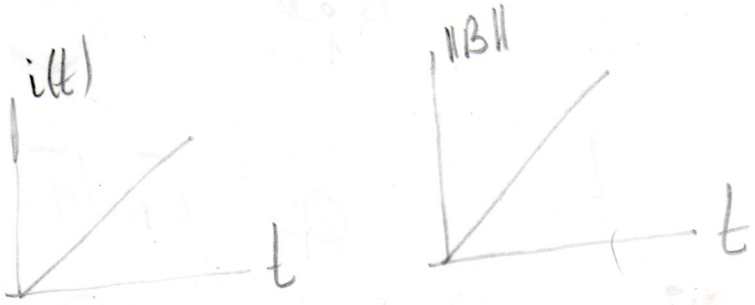
$$\|B_1\| > \|B_2\|$$

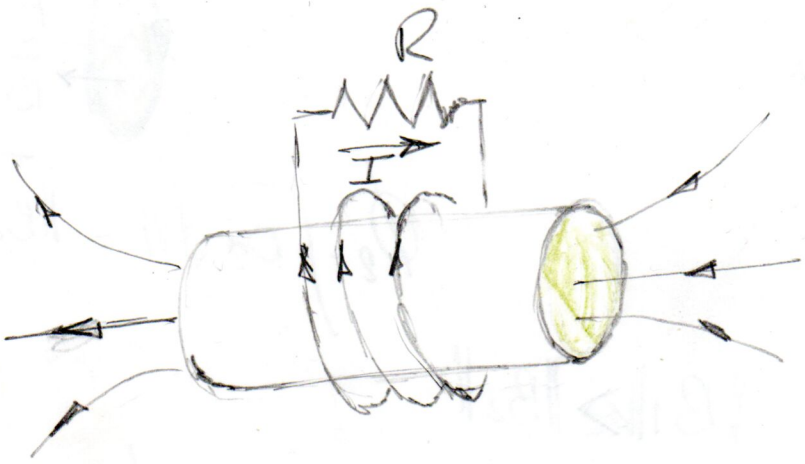
$$\Delta\phi = \|\vec{B}_2\| - \|\vec{B}_1\| < 0 \quad \text{disminuye}$$

la $\mathcal{E}$ inducida hace circular una corriente (inducida) que evita la disminución del campo magnética para mantener el flujo constante.

b)

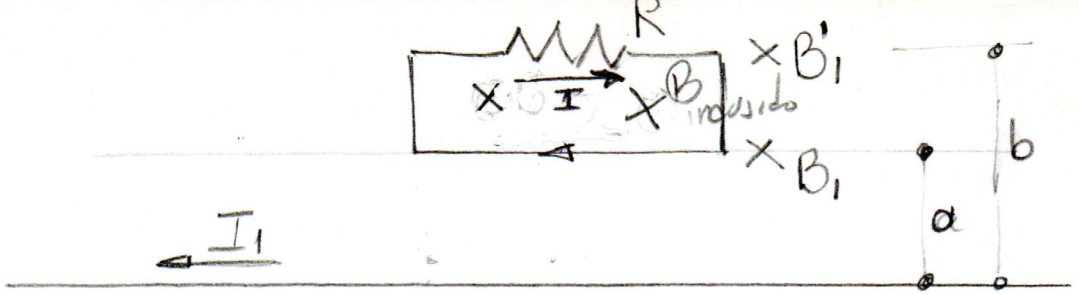


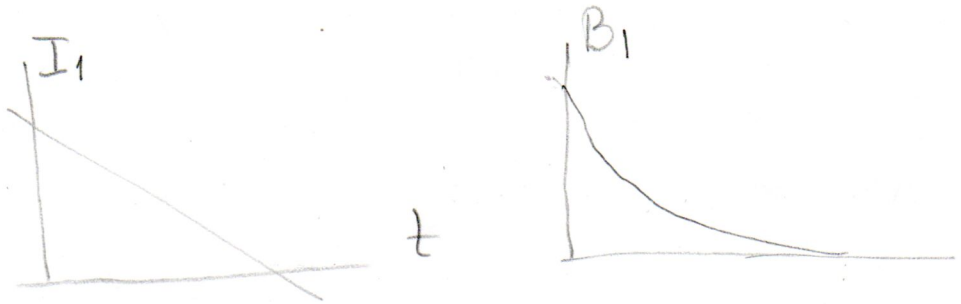


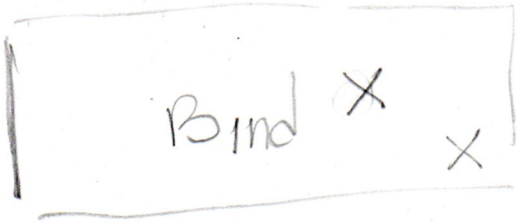


la $\mathcal{E}$ inducida hace circular una corriente (inducida) que produce un campo que se opone al que lo genera oponiendose al aumento del campo

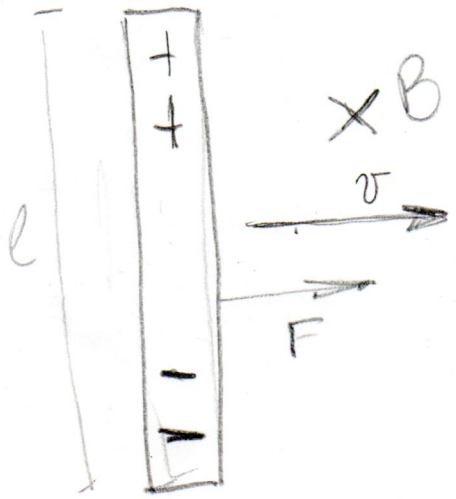
c)



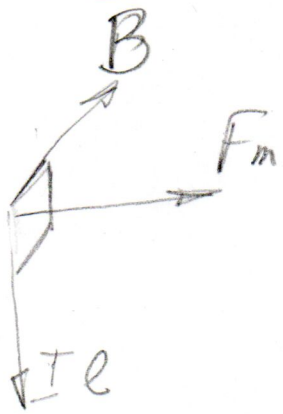




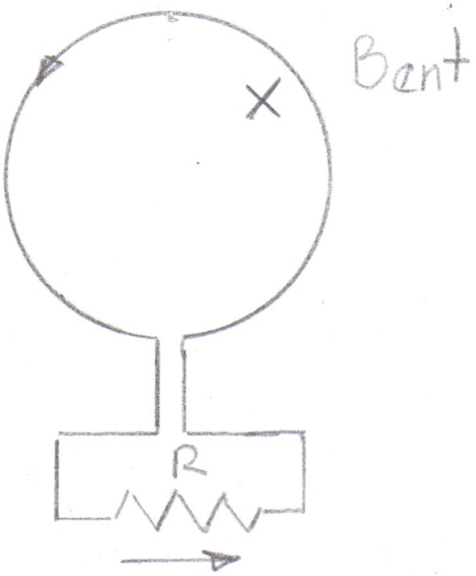
d)

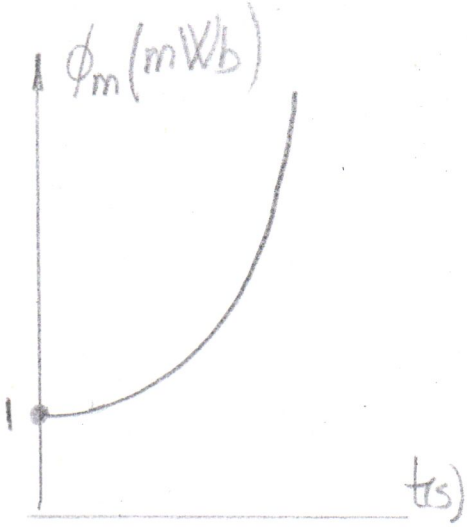


$$\bar{F} = q\bar{v} \times \bar{B}$$



30.5



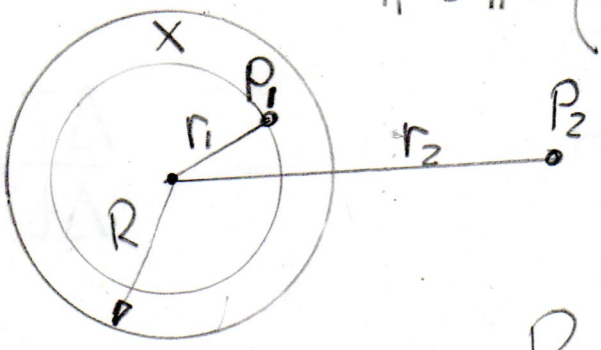


$$\phi_m = 6t^2 + 7t + 1$$

$$\mathcal{E} = -N\frac{d\phi_m}{dt} = -1\cdot(12t+7) = -12t-7\ (V)$$

$$\mathcal{E}\Big|_{t=2(s)} = -12\cdot 2^2 - 7 = -55\ (V)$$

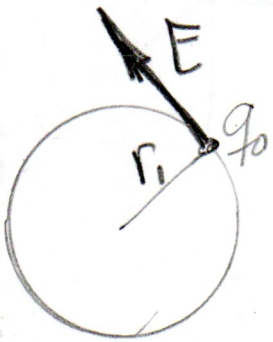
31.1 $\|B\| = (0{,}03t^2 + 1{,}4)\ (T)$



$R = 2{,}5\ cm = 0{,}025\ m$

$$\mathcal{E} = -\frac{d\Phi_m}{dt} = -\frac{dB(t)}{dt}\cdot \pi r_1^2 = 0{,}06t \cdot \pi r_1^2$$

$r_1 = 0{,}020\ m$



$W = q\mathcal{E} = qE\,2\pi r_1$

$$E = \frac{\mathcal{E}}{2\pi r_1}$$

$$\Phi_m(t) = B(t)\cdot A = B(t)\cdot \pi r_1^2$$

$$E = \frac{1}{2\pi r_1}\ 0{,}06t \cdot \pi r_1^2 = -\frac{0{,}06t \cdot 0{,}02}{2}$$

$$= 1{,}8\cdot 10^{-3}\left(\frac{N}{C}\right)$$

TP

$n = 400$ esp./m

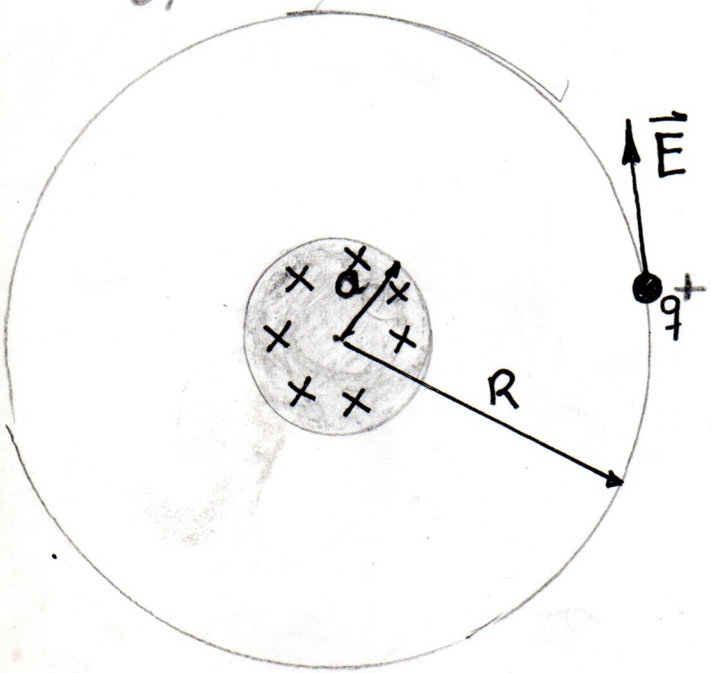
radio del solenoide $0{,}011(m) = a$

$R = 3{,}5(cm) = 0{,}035\ (m)$

$\|\vec{E}\| = 8\ 10^{-6}\ (V/m)$

$\frac{di}{dt} = ?$

Este problema es muy parecido a proble-
ma 31.1 hecho en clase. La fuente
de campo es el campo magnético en
el centro de un solenoide: $\|\vec{B}_c\| = \mu_0 n\, i(t)$



$$\mathcal{E} = \|\vec{E}\|\, 2\pi R$$

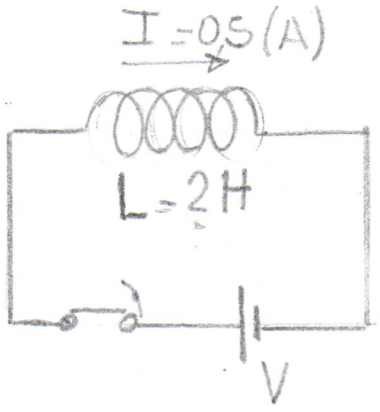
$$\|\vec{E}\| = \frac{\mathcal{E}}{2\pi R} = \frac{\mu_0 n \frac{di}{dt} \pi a^2}{2\pi R}$$

$$|\mathcal{E}| = N \frac{d\phi_m}{dt} = \frac{dB}{dt}\pi a^2$$

$$\frac{dB}{dt} = \mu_0 n \frac{di}{dt}$$

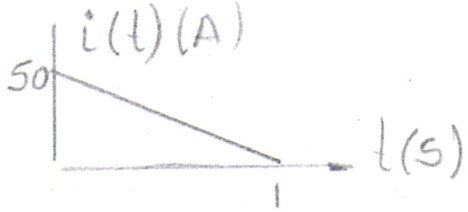
$$\frac{di}{dt} = \frac{\|\vec{E}\| \cdot 2\pi R}{\mu_0 n \cdot \pi a^2} = 9{,}21\ A/s$$

32.1)



$t = 10\ ms = 0{,}01\ s$

$$\frac{\Delta I}{\Delta t} = \frac{I_f - I_0}{t - t_0} = \frac{0 - 0{,}5}{0{,}01 - 0} = -\frac{0{,}5}{0{,}01} = -50\left(\frac{A}{s}\right)$$



$$\mathcal{E} = -N\frac{d\Phi_m}{dt} = -L\frac{dI}{dt}$$

$$L = \frac{N\,\Phi_m}{I}$$

$$[L] = (H) = \left(\frac{V.s}{A}\right)$$

$$|\mathcal{E}| = -2(H)\cdot\frac{-0{,}5\ (A)}{0{,}01\ s} = |\pm 100|\ (V)$$

32.3

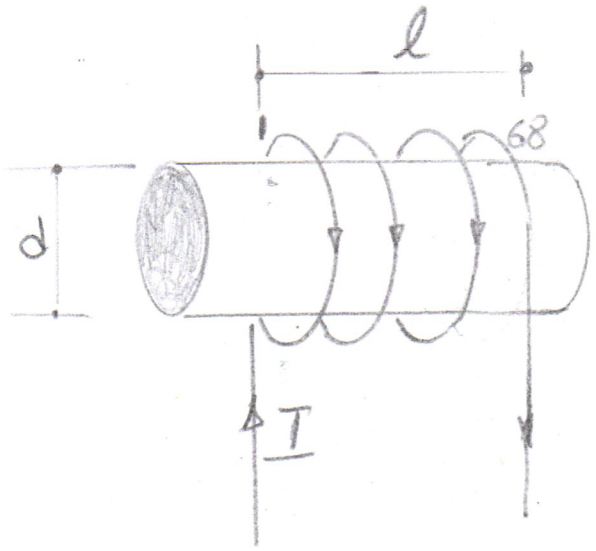
$$L = \frac{N \phi_m}{I}$$

$$\phi_m = \frac{L I}{N} = \frac{7{,}2\ 10^{-3} \cdot 10 \cdot 10^{-3}}{300} =$$

$$= 240 \cdot 10^{-9}\ (Wb)\ \text{por c/vuelta}$$

$$H = \frac{V_s}{A}$$

33_1



$N = 68$ espiras

$\ell = 8\ cm = 0{,}08\ m$

$d = 1{,}2\ cm = 1{,}2 \cdot 10^{-2}\ m$

$I = 0{,}77\ (A)$

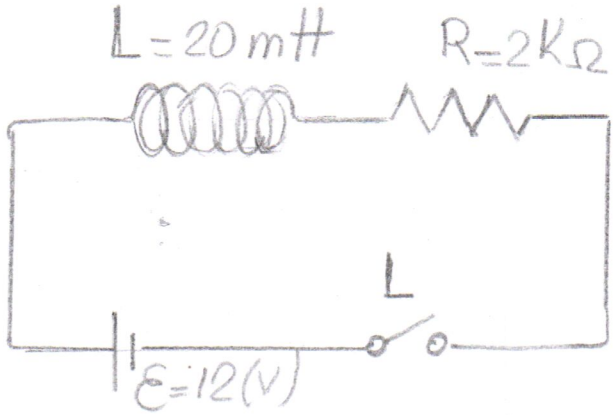
$$L = \frac{\mu_0 N^2 A}{\ell} = \frac{4\pi 10^{-7} 68^2 \pi \left(\frac{1{,}2}{2} 10^{-2}\right)^2}{8\ 10^{-2}} =$$

$$L = 8{,}215\ (\mu H)$$

$$U = \frac{1}{2} L I^2 = \frac{1}{2} \cdot 8{,}215 \cdot 10^{-6} \cdot 0{,}77^2 =$$

$$= 2{,}44\ 10^{-6}\ (J)$$

34.1



a) $\tau = \frac{L}{R} = \frac{20\,10^{-3}}{2000} = 10(\mu s)$

b) $i(t) = \frac{\varepsilon}{R}\left(1 - e^{-t/\tau}\right) = 6\,10^{-3}\left(1 - e^{-t/\tau}\right)$

$5{,}94 \cdot 10^{-3} = 6 \cdot 10^{-3}\left(1 - e^{-t/\tau}\right)$

$\frac{5{,}94 \cdot 10^{-3}}{6 \cdot 10^{-3}} = 1 - e^{-t/\tau} \longrightarrow e^{-t/\tau} = 1 - \frac{5{,}94}{6}$

$\ln 0{,}01 = -\frac{t}{\tau}$

$t = -\tau \ln 0{,}01 = 46\,\mu s$

$= 4{,}6\,\tau$