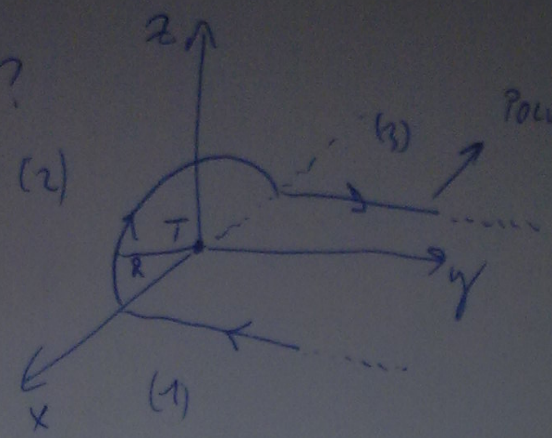
(1)

$B_{\sim}(0,0,0) = ?$

$T_{PROMAT.}$

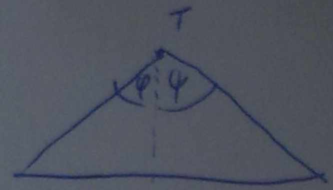


SILNICE:

(1), (3)

$$H = \frac{I}{4\pi r}\left(\sin\varphi + \sin\psi\right).$$

(SMJER)



1) TOČKA

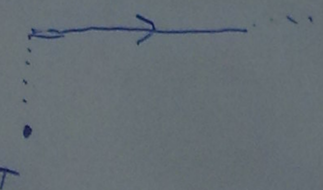
2) SIMETRALA

3) KUTEVI

- KUT RASTE OD SIMETRALE

NPR.

(3) (ili (1))



$\varphi = 0$ "POČETAK"

$\psi = 90°$ "KRAJ" = ZBOG BESKONAČNOSTI

SMJER: PRAVILO DESNE RUKE:

1) PALAC SMJER STRUJE

2) PRSTI SMJER U TOČKU

3) OKOMICA NA TOČKU U SMJERU ZATVARANJA ŠAKE

---

(2)

$$H_0 = \left\{ \begin{matrix} \text{CIJELI} \\ \text{KRUG} \end{matrix} = \text{BERBEROVIĆ} \right\} = \frac{I}{2} \frac{r_0}{(r_0^2 + z^2)^{3/2}}$$

$$H_a = \text{POLUKRUG} = \frac{I}{4} \frac{r^2}{(r^2 + z^2)^{3/2}}$$

za

(1) $(-\bar{a}_z)$

(3) $(-\bar{a}_z)$

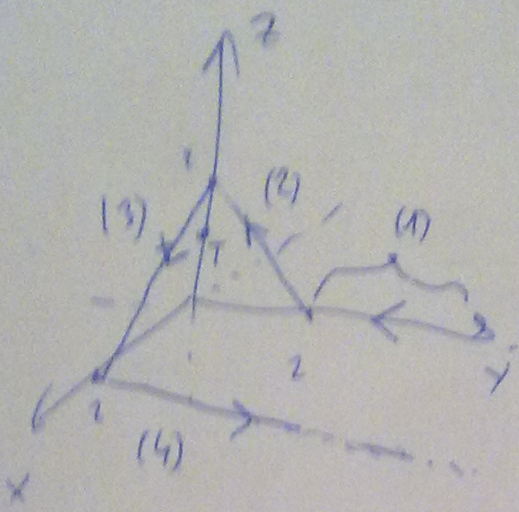
UKUPAN $\bar{B}$:

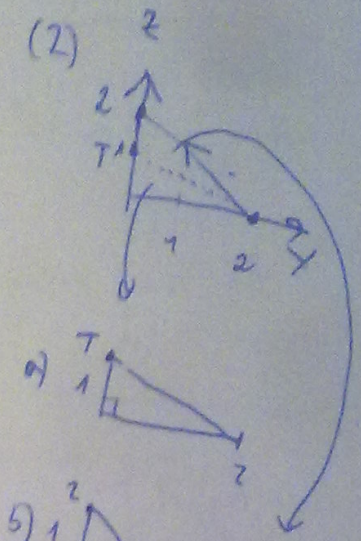
$$\bar{B} = \mu_0 \frac{I}{4\pi R}\left((-2)\bar{a}_z + (-\pi)\bar{a}_y\right)$$

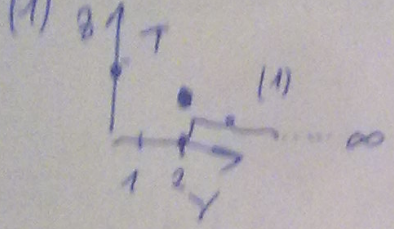
(MOGUĆE KRIVO PREPISANO)

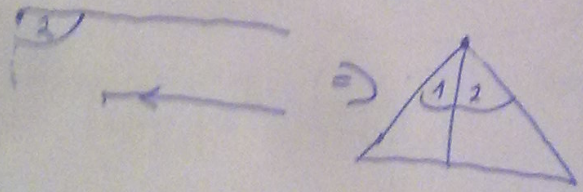
2.

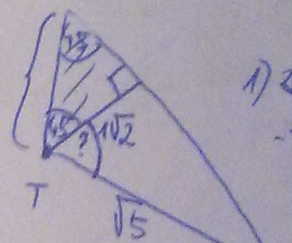
$T(0,0,1)$



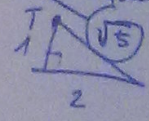






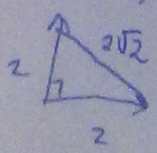


1) ZNAMO DA JE ∢ JEDNAKO KRAĆAN ONDA $1\sqrt{2}$



2) ~ a) PITAGORA

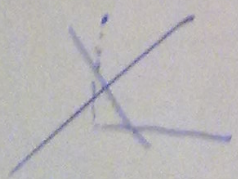
3) UKUPNI TROKUT (sa a) i b))

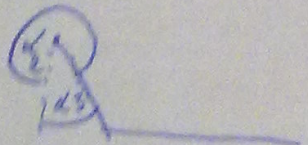


1) SIMETRALA

2) KUT 2 V ∠ = KRAJ PRAVCA

3) KUT 1 => POČETAK PRAVCA

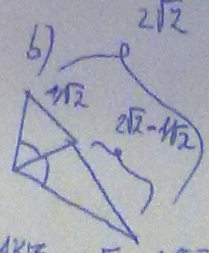




$\alpha_2 = 360° - \alpha_3$

4) SMJER l

4)

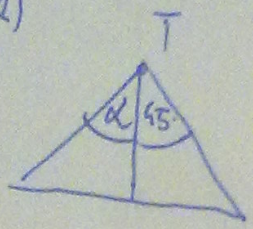


DALJE $2\sqrt{2} - 1\sqrt{2}$ (ZADNJA STRANA)

$$H = \frac{I}{4\pi \dots} \left[\sin 90° + \sin(360° - \alpha_3) \right] (-\overline{a_x})$$

KUTEVI

(2)



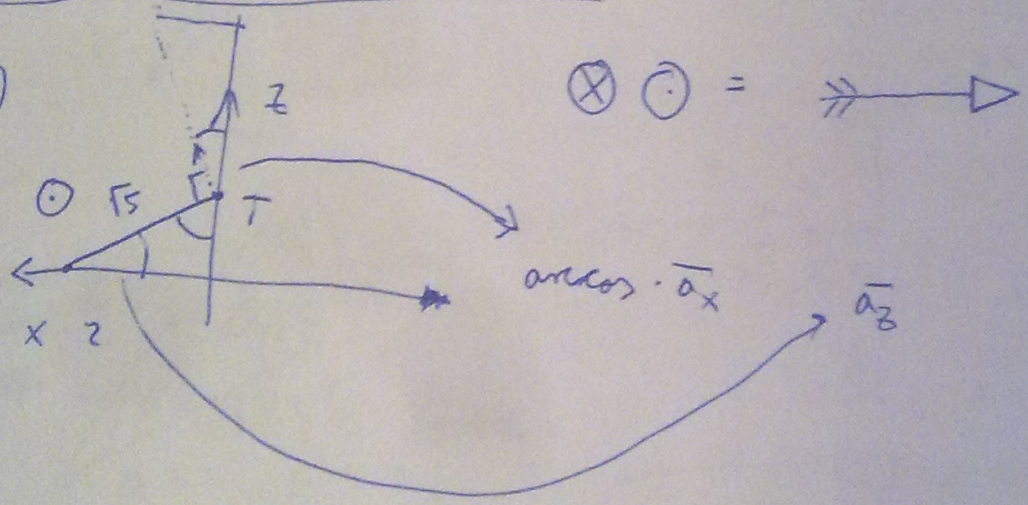
$$H_2 = \frac{I}{4\pi}\left(\sin 45° + \sin A\right)\cdot(\bar{a}_x)$$

$$A = \sin\left(\operatorname{arctg}\left[\frac{(2\sqrt{2} - 1\sqrt{2})}{(1/\sqrt{2})}\right]\right)$$

$$H_3 = (\bar{a}_y)\,|\bar{H}_2|$$

---

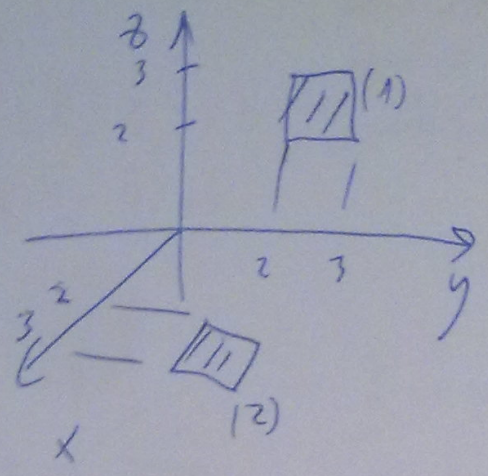
(4)



$\otimes$ $\odot$ = ⇉

$$(\text{TOČNO}) = \bar{a}_x\left(\frac{1}{\sqrt{5}}\right) + \bar{a}_z\left(\frac{2}{\sqrt{5}}\right)$$

$$H = \frac{I}{4\pi\sqrt{5}}\left[\bar{a}_x\left(\frac{1}{\sqrt{5}}\right) + \bar{a}_z\left(\frac{2}{\sqrt{5}}\right)\right]$$



$$\bar{A} = \left(\frac{1}{x+2y+3}\right)\bar{a}_z$$

1) $\bar{B}(1,2,3) = ?$ (na (1))
2) $\phi(1) = ?$
3) $\bar{J}(3,2,1) = ?$
4) $I \to (2) = ?$

FORMULE

$$\bar{B} = (\nabla) \times \bar{A}$$

$\left(\frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z}\right)$ = DERIVACIJA — ROTOR

OPĆENITO: $\bar{V}_1 = A\bar{a}_x + B\bar{a}_y + C\bar{a}_z$

VEKTOR = $(A, B, C) = (X, Y, Z)$

$$\bar{B} = \bar{V}_1 \times \bar{V}_2$$

1 2 3 1 2 3

$$\bar{B} = (X, Y, Z) \times (X, Y, Z)$$

(1) (2)

$$\bar{B} = [(2\cdot 3 - 3\cdot 2), (3\cdot 1 - 1\cdot 3), (1\cdot 2 - 2\cdot 1)]$$

REDOSLIJED: (1)(2) (1)(2) (1)(2) / (1)(2) (1)(2) / (1)(2) (1)(2)

$$= (K_1, K_2, K_3)$$

$$\bar{A} = \left(0, 0, \frac{1}{x+2y+3}\right)$$

$$\nabla = \left(\frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z}\right)$$

$K_3 = \overrightarrow{1\,2\,(3)}$ $\overleftarrow{1\,2\,(3)}$

$K_2 = \overleftarrow{1\,(2)\,3}$ $\overrightarrow{1\,(2)\,3}$

$K_1 = \overrightarrow{(1)\,2\,3}$ $\overleftarrow{(1)\,2\,3}$

1) KAD BIRAMO BROJ KONSTANTE TAJ BROJ NE OBILAZIMO

2) 1 ALTERNIRAMO SMJER $\to, \leftarrow, \to$ (KOJIM POČINJEMO BIRATI)

---

1) RJEŠENJE:

$$\bar{B} = (-2)\,a_x \frac{1}{(x+2y+3)} + \bar{a}_y \frac{1}{(x+2y+3)}$$

$B(1,2,3) = 34.9\ mT$

---

2) TOK

a) $\phi = \iint \bar{B} \cdot \bar{n}\, ds$

b) $\bar{n}$ = PLOČA = $\bar{a}_x$

c) ds = PROJEKCIJA RAVNINE = $dy\,dz$

d) $\bar{B}$ = IMAMO OTPRIJE

e) GRANICE $z \in 2,3$

$y \in 2,3$

3) GUSTOĆA STRUJE

$$\bar{J} = \nabla \times \bar{H} \qquad \bar{B} = \mu_0 \cdot \bar{H}$$

$$\bar{J} = \frac{1}{\mu_0}(\nabla \times \bar{B}) \Rightarrow (\partial x, \partial y, 0) \times (B_x, B_y, 0)$$

$$\bar{J} = \bar{a}_z \frac{(-10)}{\mu_0 (x+2y+3)}$$

$\bar{J}(3,2,1) = \ldots\ A/m^2$

4) STRUJA od (2)

a) $I = \iint \bar{j} \cdot \bar{n} \, ds$

b) $\bar{j}$ imamo

c) $\bar{n} = \cancel{dx/dy} \, \bar{a}_z$

d) $ds = dx \, dy$

e) $x \in 2,3$

$y \in 2,3$

$= 7633 \, A$

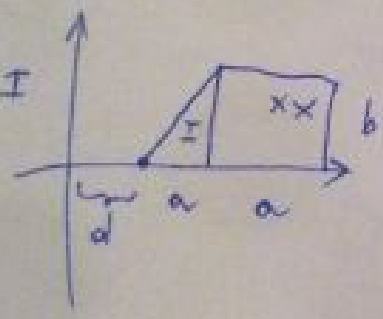
(BONUS) ISPIT:

- STRUJNICA
- UVJETI (NA GRANICI ?)
- ROTACIJA SUSTAVI
- SILE I MEĐUINDUKTIVITETI (MODEL KRUG)
- FARADAY (2 ZADATKA ?) (NOVI + STARI = 2)
- VALOVI

BILI ZADACI SA PRVOG IE:
- BERBEROVIĆ
- ŠTIH

VARIJANTE: 1) ŠUPALJ VODIČ
2) $\bar{J} = \overline{ad}$

3.40



$a = 1\ m$
$b = 1\ m$
$d = 2\ m$

TIJELA:
TROKUT
POLUKRUG
PRAVOKUTNIK
KRUŽNICA: BERBEROVIĆ

1) 

2)
$$M = \frac{\mu}{4\pi} \oint\oint \frac{d\bar{l}_1 \cdot d\bar{l}_2}{R}$$

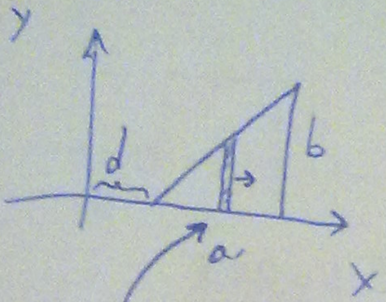
3) $M = \frac{\phi}{I}$

4) $\phi = \phi_1 + \phi_2$
$= \iint \frac{\mu_0 I}{2 \times \pi} dS_I + \iint \frac{\mu_0 I}{2 \times \pi} dS_{II}$

1) $\phi = \iint B\, ds$

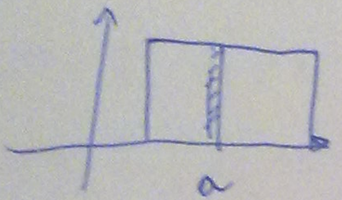
I) $B = \frac{\mu_0 I}{2 \times \pi}$

7)



8) $dS_I = y \cdot dx = \frac{(x-d) \cdot b}{a} dx$

9)



10) $dS_{II} = y \cdot dx = b \cdot dx$

dx ↓ U SMJERU X-OSI

y ↓ PO DUŽINI Y-OM

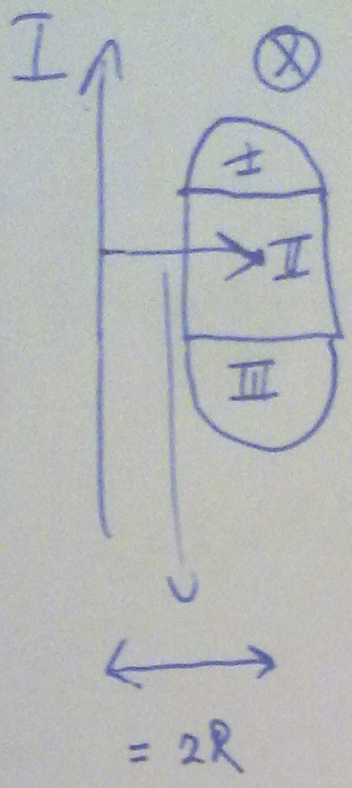
11) $\phi = \int_{x=d}^{2a=a+a} \frac{\mu_0 \cdot I}{2 \times \pi} \frac{b}{a}(x-d)dx + \int_{d+a}^{d+2a} \frac{\mu_0 \cdot I}{2 \times \pi} \cdot b \cdot dx$

. . . . . .

12) $\phi = \frac{\mu_0 \cdot I \cdot b \cdot d}{2\pi a} \ln\left(\frac{d+a}{d}\right) + \frac{\mu_0 I \cdot b}{2\pi} \ln\left(\frac{d+a}{d}\right)$

$M = \frac{\phi}{I} = 95.35$ mH

m ↓ 10^{-3}



$I = III$

$(2.5 - 2)R \Rightarrow II, h = 0.5R$

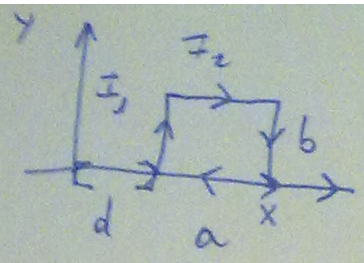
POVRŠINA BITNA

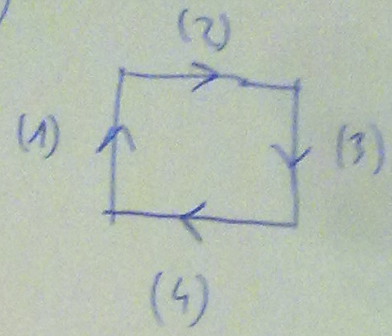
B je u R SMJERU, (SAMO OKOMITO NA I)

$$M_0 = \mu_0 \cdot \left(d - \sqrt{a^2 - R^2}\right) =$$

$$\frac{\mu_0 \cdot I \cdot \frac{R}{2}}{2\pi} \int_2^{3R} \frac{dr}{r} = \frac{\mu_0 I R/2}{2\pi} \ln(3)$$

= UVIJEK PRIMJENJUJEMO SUPERPOZICIJU

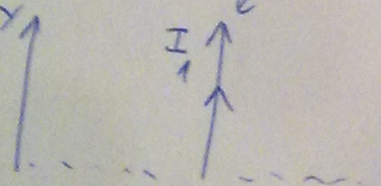
1) 

2) 

3) $a = 1$ $\quad I_1 = I_2 = 1\,A$
$b = 1$
$d = 2\,m$

4) $\bar{F} = I \cdot (\bar{l} \times \bar{B})$
$d\bar{F} = I\, d\bar{l} \times \bar{B}$
$F = I \cdot \int d\bar{l} \times \bar{B}$
↳ DJELUJE PREMA ILI OD

5) $\bar{F}_1 = (za\ I_1) = I_2 \cdot \int d\bar{l}_1 \times \bar{B}_1$ → GLEDA SE → (STRUJA) KOJA UZROKUJE

6) 

$\bar{a}_y \cdot dy$
↓ uzduž y-osi u smjeru y

7) $\bar{B} = \frac{\mu_0 \cdot I_1}{2\pi x}(-\bar{a}_z)$

8) SMJER ODREĐUJEMO:
1) PRSTI U SMJERU STRUJE (I) $\bar{a}_y$
2) PALAC je okomica $(-\bar{a}_x)$ (Φ)
3) IZBIJA IZ DLANA (B)
$(-\bar{a}_z)$???

9) $= I_2 \cdot \int_0^1 \frac{-\bar{a}_x \mu_0 \cdot I}{2x\pi} dy$

$\bar{F}_1 = -\bar{a}_x \frac{\mu_0 \cdot I_2 \cdot I_1}{2 \cdot d \cdot \pi} \cdot b$

10) $\bar{F}_3 =$ dl (STRUJA SMJER)
↳ $(-\bar{a}_y)$ → (PALAC) $\Rightarrow \bar{a}_x \cdot \frac{\mu_0 I_2 (I_1)}{2\pi(d+a)} \cdot b$

11) $\bar{F}_2 = I_2 \int_d^{d+a} dx \cdot \bar{a}_y \frac{\mu_0 \cdot I}{2\pi x}$

12) $\bar{F}_4 = -\bar{F}_2$, $\boxed{div B = 0}$???
I_2 = PO IZNOSU = I_1