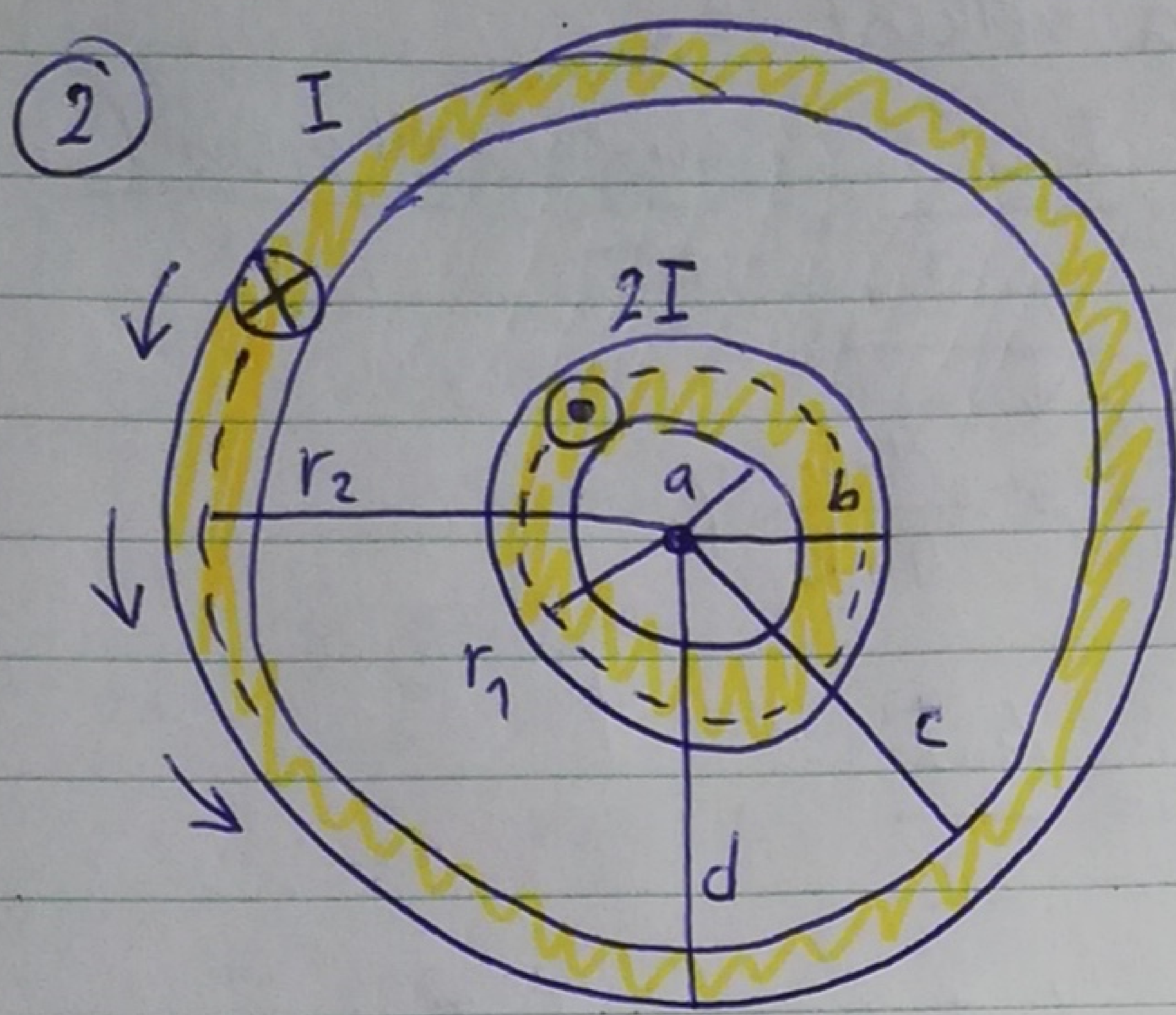


B ✓ $a < r < b$

$c < r < d$

$$\oint \vec{B} \cdot \vec{dl} = \int \frac{\mu_0 I}{2\pi} d\alpha = \frac{\mu_0 I}{2\pi} \int d\alpha$$

$$= \mu_0 I'$$

$a < r < b$

$$\oint B \cdot dl \cdot \cos\varphi = \mu_0 I'$$

$$I' = \frac{2I}{\pi b^2 - \pi a^2} \pi (r_1^2 - a^2)$$

$$\oint B \cdot dl \cdot \cos^\circ = \mu_0 I'$$

$$B \int dl = \mu_0 I'$$

$$B\, 2\pi r_1 = \mu_0 \cancel{\frac{2I}{b^2}(r_1^2 - a^2)} \frac{2I}{b^2 - a^2}(r_1^2 - a^2)$$

$$\cancel{B = \frac{\frac{\mu_0}{1} \cdot \frac{2I}{b^2}(r_1^2 - a^2)}{2\pi r_1}} \quad B = \frac{\mu_0 I (r_1^2 - a^2)}{\pi r_1 (b^2 - a^2)}$$

$c < r < d$

$$\oint \vec{B} \vec{dl} = \mu_0 I'$$

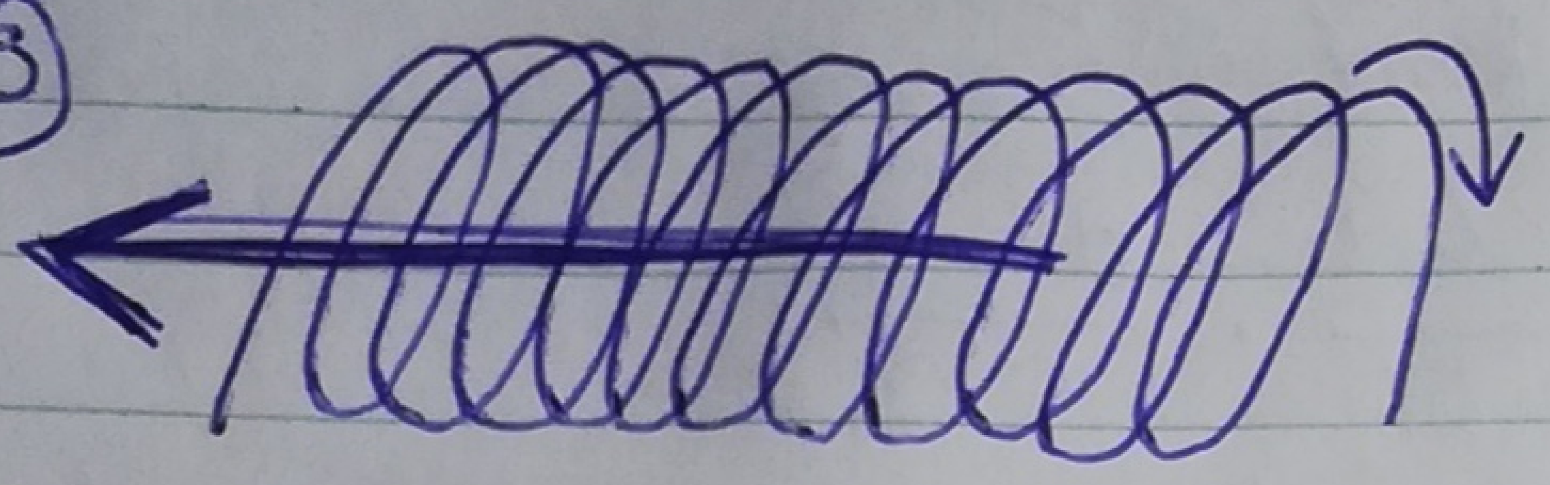
$$I' = \frac{-I}{\pi(d^2 - c^2)} \cdot \pi (r_2^2 - c^2) + 2I$$

$$B\, 2\pi r_2 = \mu_0 I'$$

$$B = \frac{\mu_0 \frac{-I}{\pi(d^2 - c^2)} \pi (r_2^2 - c^2) + 2I}{2\pi r_2}$$

$$B = \frac{\mu_0}{2\pi r_2}\left(2I - \frac{I(r^2 - c^2)}{d^2 - c^2}\right)$$

(3)



$$\oint \vec{B}\,d\vec{l} = \mu_0 I'$$

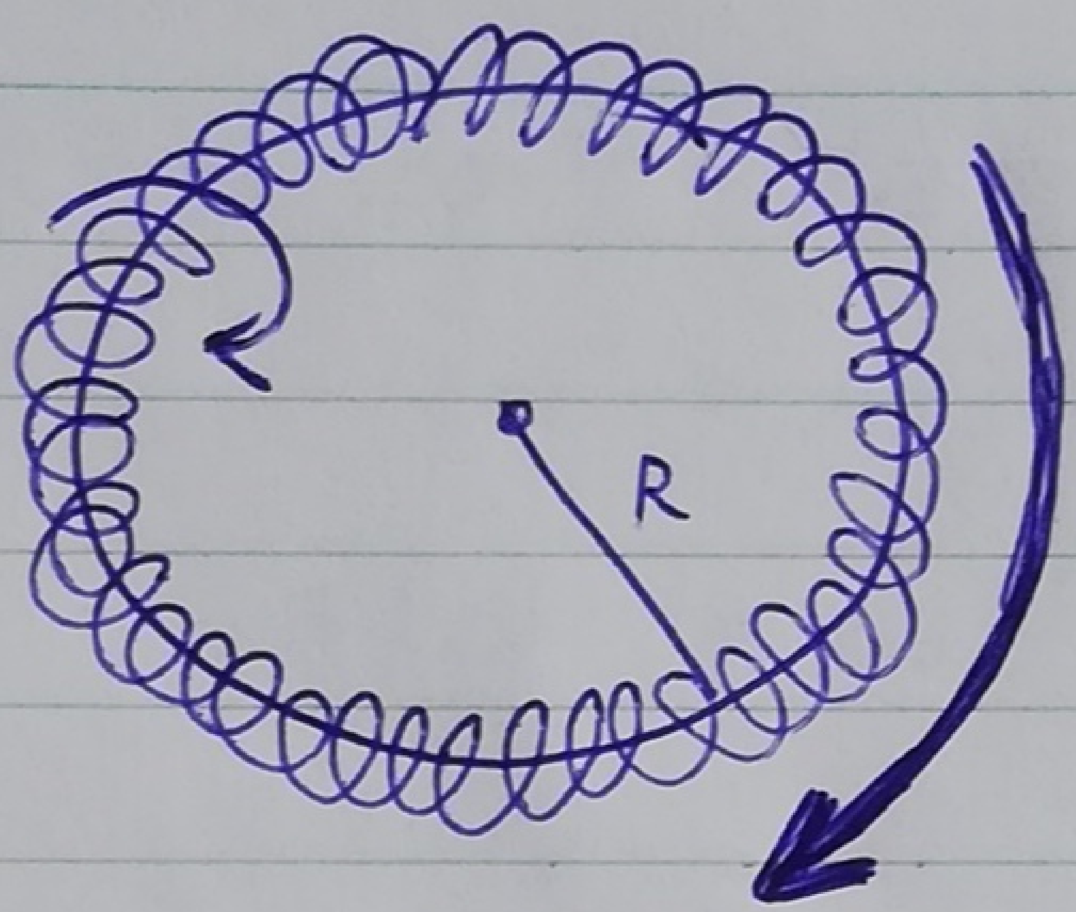
$$B = \mu_0 I n$$

$$I' = nLI$$

$$\oint \vec{B}\,d\vec{l} = \mu_0 nLI$$

$$B\,2\pi R = \mu_0 nLI$$

$$B = \frac{\mu_0 nLI}{2\pi R}$$

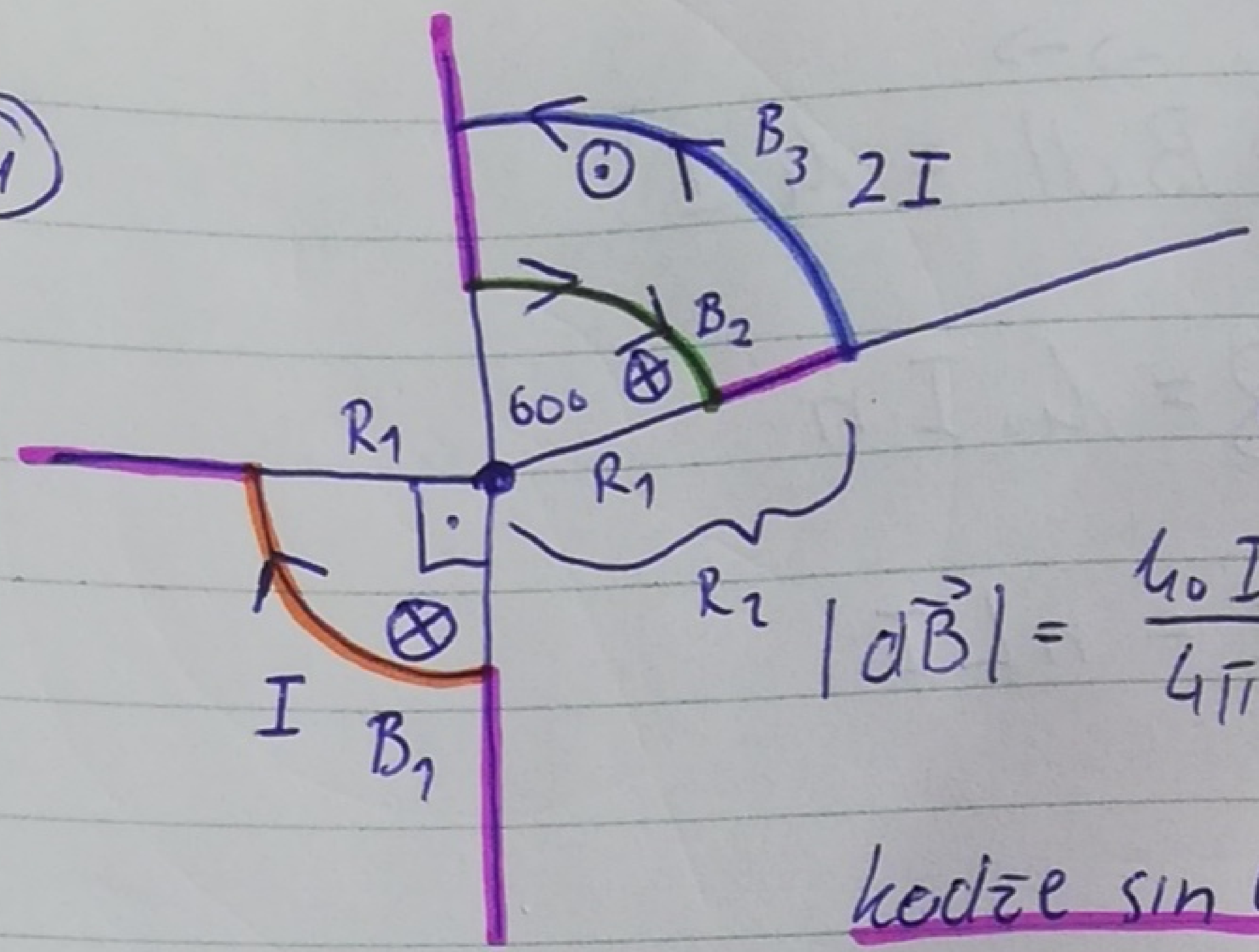


$$B\,2\pi R = \mu_0 n I$$

$$B = \frac{\mu_0 n I}{2\pi R}$$

pre n ~~N~~ závinov hustota $\cancel{N} = \frac{\cancel{N}\ \text{záviny}}{2\pi R}$

4



Rovné časti :

$$\vec{dB} = \frac{\mu_0 I}{4\pi} \cdot \frac{\vec{dl} \times \vec{r}}{r^3}$$

$$|\vec{dB}| = \frac{\mu_0 I}{4\pi} \frac{|\vec{dl} \times \vec{r}|}{r^3} = \frac{\mu_0 I}{4\pi} \cdot \frac{dl \cdot r \cdot \sin\varphi}{r^3}$$

keďže $\sin 0°$ a $\sin 90° = 0$ => rovné časti neprispievajú k poľu

$$B_1 \otimes = \frac{\mu_0 I}{4\cancel{\pi} R_1} \frac{\cancel{\pi}}{2} = \frac{\mu_0 I}{8 R_1}$$

$$B_2 \otimes = \frac{\mu_0 2I}{4\cancel{\pi} R_1} \frac{\cancel{\pi}}{3} = \frac{\mu_0 2I}{12 R_1} = \frac{\mu_0 I}{6 R_1}$$

$$B_3 \odot = \frac{\mu_0 2I}{4\pi R_2} \frac{\pi}{3} = \frac{\mu_0 I}{6 R_2}$$

$$B = B_1 + B_2 - B_3 = \frac{\mu_0 I}{8 R_1} + \frac{\mu_0 I}{6 R_1} - \frac{\mu_0 I}{6 R_2}$$

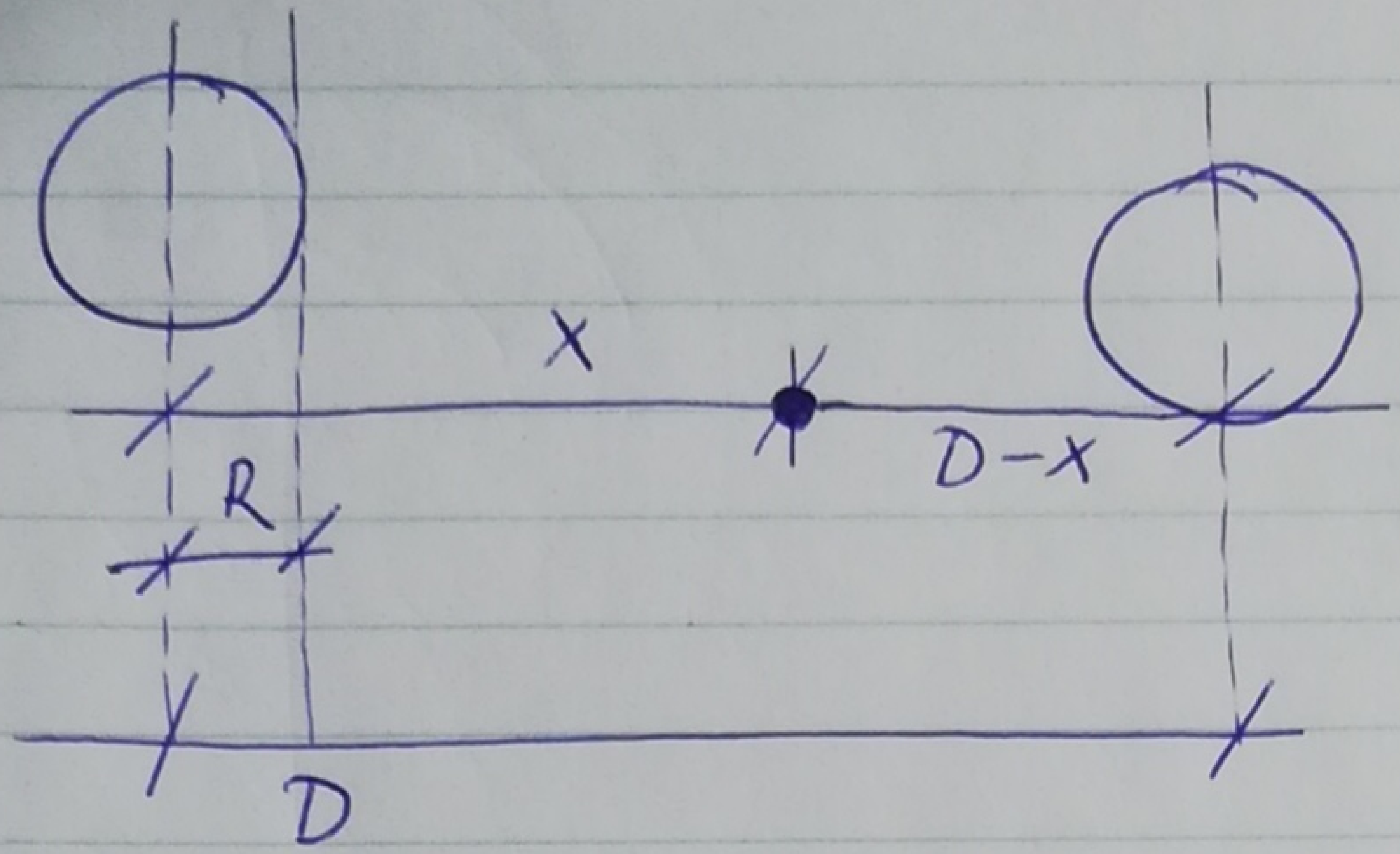
$$= \frac{7}{24} \frac{\mu_0 I}{R_1} - \frac{1}{6} \frac{\mu_0 I}{R_2}$$

vychádzame z toho že

$R_2 > R_1 \wedge I = I$ => orientované v smere B_1 & B_2

$B \otimes$

⑤



$$\oint \vec{B}\,\vec{dl} = \mu_0 I'$$

a) $B_1 \oint dl = \mu_0 I \dfrac{\pi x^2}{\pi R^2}$ $\qquad$ $B_2 \oint dl = \mu_0 I$

$B_1 2\pi x = \mu_0 I \dfrac{x^2}{R^2}$ $\qquad$ $B_2 2\pi (D-x) = \mu_0 I$

$B_1 = \dfrac{\mu_0 I}{2\pi R^2} x$ $\qquad$ $B_2 = \dfrac{\mu_0 I}{2\pi (D-x)}$

$$B = B_1 - B_2 = \frac{\mu_0 I}{2\pi R^2} x - \frac{\mu_0 I}{2\pi (D-x)}$$

b) $B_1 2\pi x = \mu_0 I$ $\qquad$ $B_2 2\pi (D-x) = \mu_0 I$

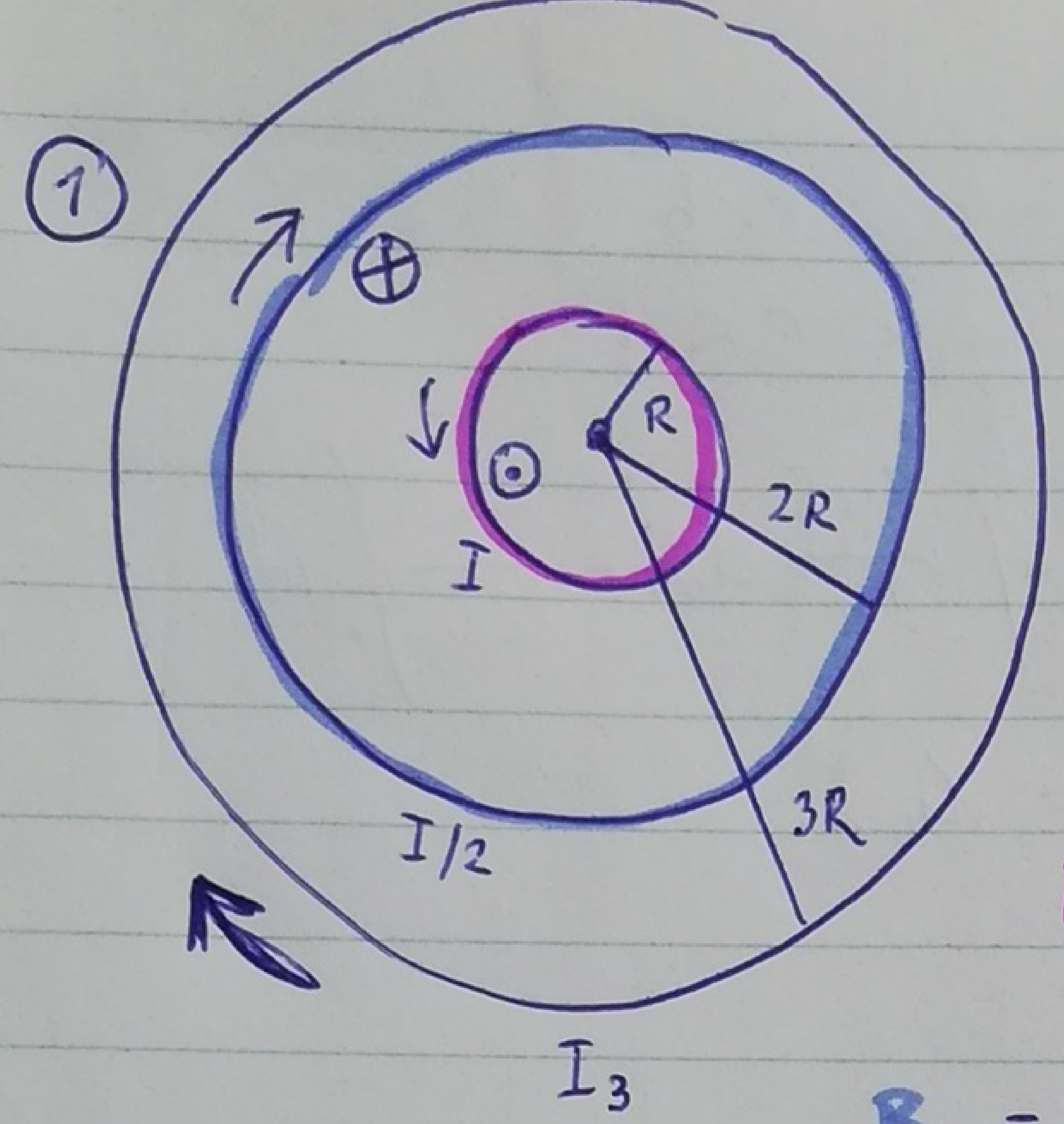
$B_1 = \dfrac{\mu_0 I}{2\pi x}$ $\qquad$ $B_2 = \dfrac{\mu_0 I}{2\pi (D-x)}$

$$B = B_1 - B_2 = \frac{\mu_0 I}{2\pi x} - \frac{\mu_0 I}{2\pi (D-x)}$$

c) $B_1 2\pi x = \mu_0 I$ $\qquad$ $B_2 2\pi (D-x) = \mu_0 I \dfrac{\pi (D-x)^2}{\pi R^2}$

$B_1 = \dfrac{\mu_0 I}{2\pi x}$ $\qquad$ $B_2 = \dfrac{\mu_0 I}{2\pi R^2} (D-x)$

$$B = B_1 - B_2 = \frac{\mu_0 I}{2\pi x} - \frac{\mu_0 I}{2\pi R^2} (D-x)$$



smer a veľkosť I_3

$$d\vec{B} = \frac{\mu_0}{4\pi}\,\underbrace{\frac{I\,d\vec{l}\,\vec{r}}{r^3}}_{} = \frac{\mu_0 I}{4\pi}\cdot\frac{dl\,r\sin\varphi}{r^3}$$

$r = R$

$$B = \int_0^{\varphi_0} \frac{\mu_0 I R \varphi}{4\pi R^2} = \frac{\mu_0 I}{4\pi R}\varphi_0$$

$$B_1 = \frac{\mu_0 I}{4\cancel{\pi} R}2\cancel{\pi} = \frac{\mu_0 I}{2R}$$

$$B_2 = \frac{\mu_0\, 0.5 I}{4\cancel{\pi}\, 2R}2\cancel{\pi} = \frac{\mu_0 I\, 0.5}{4R} = \frac{\mu_0 I}{8R}$$

$$B_{12} = B_1 - B_2 = \frac{\mu_0 I}{2R} - \frac{\mu_0 I}{8R} = \frac{3\mu_0 I}{8R}$$

$$B_3 = \frac{\mu_0 I_3}{4\pi 3R}2\pi = \frac{\mu_0 I_3}{2\cancel{\pi}\cdot 3R} = \frac{\mu_0 I_3}{6R}$$

$$\frac{3\mu_0 I}{8R} \pm \frac{\mu_0 I_3}{6R} = 0 \qquad \left|\frac{3}{8}I\right| = \left|\frac{1}{6}I_3\right|$$

$$\left|\frac{3}{8}\cdot\frac{6}{1}I\right| = \left|I_3\right|$$

$$\frac{3\mu_0 I}{8R} = \pm\frac{\mu_0 I_3}{6R} \quad /\cdot 6R \qquad \left|\frac{18}{8}I\right| = \left|\frac{9}{4}I\right|$$

$$\frac{3\mu_0 I}{8R}\cdot 6R = \pm\mu_0 I_3 \qquad \left|I_3\right| = \left|\frac{9}{4}I\right|$$

$$\frac{9\mu_0 I}{4} = \pm\mu_0 I_3 \quad /:\mu_0$$

$$\frac{9I}{4} = \left|I_3\right|$$

$B_3 \otimes$; $I_3 = \left|\frac{9}{4}I\right|$