

FINAL EXAM

Name (print) Condella Name (signed) _____ P _____

Discussion Instructor (circle): Brown Chakhbazian Condella Portnoi Zhukov
 Discussion Section # _____

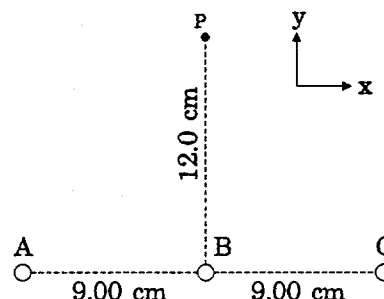
SHOW ALL WORK!!!!

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

Given three long straight wires, A, B and C that are perpendicular to the plane of the paper. Calculate the magnetic field, magnitude and direction, at P. Use the x-y axes shown. Positive (+) current means current coming out of the paper, negative (-) is current going into the paper.

$I_A = +8.00 \text{ A}$
 $I_B = -4.00 \text{ A}$
 $I_C = -11.00 \text{ A}$



$$B_{Ax} = -\frac{\mu_0 |I_A|}{2\pi (r)} \cos \alpha = -8.53 \times 10^{-6} \text{ T}$$

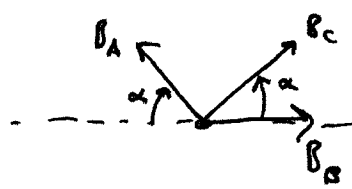
$$B_{Ay} = \frac{\mu_0 |I_A|}{2\pi (r)} \sin \alpha = 6.40 \times 10^{-6} \text{ T}$$

$$B_{Bx} = 6.67 \times 10^{-6} \text{ T}, \quad B_{By} = 0$$

$$= \frac{\mu_0 |I_B|}{2\pi (r)}$$

$$B_{Cx} = \frac{\mu_0 |I_C|}{2\pi (r)} \cos \alpha = 8.83 \times 10^{-6} \text{ T}$$

$$B_{Cy} = \frac{\mu_0 |I_C|}{2\pi (r)} \sin \alpha = 8.83 \times 10^{-6} \text{ T}$$



$\cos \alpha = \frac{.12}{.15}$
 $\sin \alpha = \frac{.09}{.12}$

$$\vec{B} = (B_{Ax} + B_{Bx} + B_{Cx}) \hat{i} + (B_{Ay} + B_{By} + B_{Cy}) \hat{j} = 9.87 \times 10^{-6} \text{ T} \hat{i} + 1.520 \times 10^{-5} \text{ T} \hat{j}$$

$$|\vec{B}| = (B_x^2 + B_y^2)^{1/2} = 1.812 \times 10^{-5} \text{ T}$$

$$\tan \theta = \frac{B_y}{B_x} \Rightarrow \theta = 57.0^\circ$$