

FINAL EXAM

2

Name: Yue Qian

Discussion Instructor (circle): Billeter Blake Herring ~~Yang~~ Gillman

Discussion Section # _____

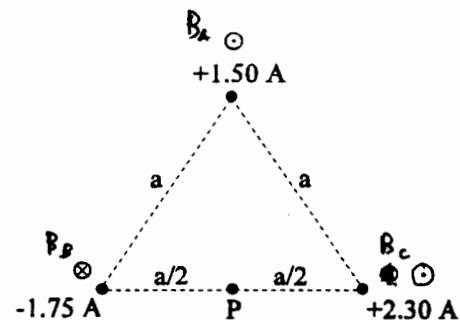
Student ID #: _____

SHOW ALL WORK!!!!

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

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

Three long, straight wires are perpendicular to the paper with the currents shown. The wires are at the corners of an equilateral triangle of side a .



- (a) Calculate the magnitude of the magnetic field at point P.
 (b) Calculate the direction of the magnetic field at P. Show with a drawing how you define this direction (clockwise or counter clockwise from a given axis).

(a)

$$B_{(A)} = \frac{1.5 \mu_0}{2\pi \cdot (\frac{a}{2})} = \frac{1.5 \mu_0}{\pi a}$$

$$B_{(B)} = \frac{-1.75 \mu_0}{2\pi \cdot (\frac{a}{2})} = \frac{-1.75 \mu_0}{\pi a}$$

$$B_{(C)} = \frac{2.3 \mu_0}{2\pi \cdot (\frac{a}{2})} = \frac{2.3 \mu_0}{\pi a}$$

$$B_{\text{total}} = B_{(A)} + B_{(B)} + B_{(C)} = \frac{1.66 \times 10^{-6}}{a} \text{ T}$$

(b)

$$\theta = \tan^{-1} \left(\frac{\frac{\mu_0}{\pi a} (I_2 + I_3)}{\frac{\mu_0 \cdot I_1}{\pi \pi a}} \right) = 77.9^\circ$$

clockwise