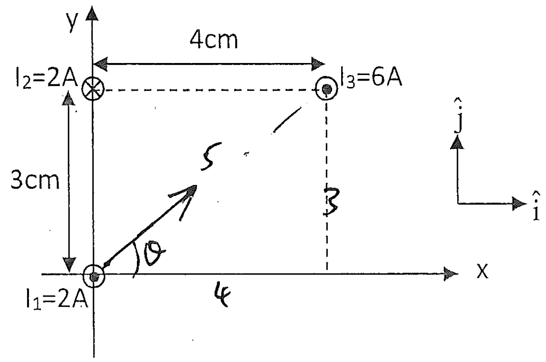
Name: ______________________________

PHY 232 Summer 2016 Class Work

Class 30. Ampere's Law

Consider three infinite long wires parallel to each other:



(a) What is the magnetic force per unit length acting on I_1 due to I_2? Please use $\hat{i}, \hat{j}, \hat{k}$ notation.

$$\vec{F}_{21} = 0\,\hat{j}$$

(b) What is the magnetic force per unit length acting on I_1 due to I_3? Please use $\hat{i}, \hat{j}, \hat{k}$ notation.

$$|\vec{F}_{31}| = 4.8\times10^{-5}\,N$$

$$F_x = 4.8\times10^{-5}\cos\theta = 4.8\times10^{-5}\times\frac{4}{5}\,N$$

$$F_y = 4.8\times10^{-5}\sin\theta = 4.8\times10^{-5}\times\frac{3}{5}\,N.$$

(c) What is the total magnetic force per unit length acting on I_1? Please use $\hat{i}, \hat{j}, \hat{k}$ notation.

(d) What is the magnitude of the total magnetic force per unit length acting on I_1? What is its direction (with respect to the +x axis)?

Maxwell's

1st Eq.

Gauss's Law $\varepsilon_0 \oiint \vec{E}\cdot d\vec{A} = Q_{in}$ | $\varepsilon_0 \nabla\cdot\vec{E} = \rho$

2nd Eq.

Gauss's Law $\oiint \vec{B}\cdot dA = 0.$ | $\nabla\cdot\vec{B} = 0.$

3rd Eq.

Ampere's Law $\oint \vec{B}\cdot d\vec{s} = \mu_0 I_{in}$ | $\nabla\times\vec{B} = \mu_0 \vec{J}$ (Current density).

Incomplete.

4th Eq. ??

Faraday's Law.