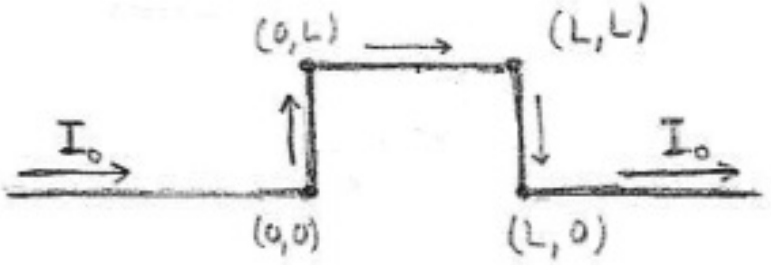
Print Names in Team: _____.

Physics 232	Mission 5: Magnetostatics

Please work each problem in the white space provided. Attach additional sheets if necessary. Print this one-sided and staple in the top left corner with a metal staple once complete. Each team turns in one document.

Problem 28 Find the electromagnetic force on a charge $Q = 3.0\ nC$ which moves at velocity $\vec{v} = \langle 10, 20, 4 \rangle\ m/s$ through a space with electric field $\vec{E} = \langle 2.0, -10, 0 \rangle\ N/C$ and magnetic field $\vec{B} = \langle 1, 2, 3 \rangle\ T$.

Problem 29 Suppose a rectangular half-loop is formed by a long-wire which has a current flowing from $(-\infty, 0)$ to $(0, 0)$ to $(0, L)$ to (L, L) and back to $(L, 0)$ and on to $(\infty, 0)$. If a magnetic field is applied such that it comes out of the page on which the loop is drawn then what is the magnetic force placed on the loop?



Problem 30 Two long wires carrying currents $I_1 = 2.5\ mA$ and $I_2 = 4.0\ mA$ are placed parallel to one another a distance $d = 0.25\ m$ apart. If both currents flow in the same direction then what is the force per unit length on the currents ? Does this force push the wires apart or does it pull them together ?

Problem 31 A current of 2.5 A flows directly out of the page at $(1, 2)m$. Find the magnitude and direction of the magnetic field $\vec{B}$ at the origin $(0, 0)$ due to the given current.

Problem 32 Consider a uniform current I_o which flows parallel to the z-axis from inner radius A to an outer radius B from the z-axis. Find the magnitude of the magnetic field a function of the distance r to the z-axis.