INS Physics Workshop 2, due April 19

1. Why can electric field lines never cross?

2. a. Calculate the repulsive electrical force between two protons given that the distance between them is 5.0×10^{-15} m.

   b. Calculate the attractive gravitational force between the same two protons as above.

   c. Calculate how many times stronger the electrical repulsion is than the gravitational attraction in the above problems . Apparently, the strong nuclear force is necessary to hold matter together!

3. A person scuffing her feet on a wool rug on a dry day accumulates a net charge of -60μC. How many excess electrons does this person get?

4. Charge $Q_1 = +65\mu$C and is located at point (0, 30). Charge $Q_2 = -86\mu$C and is located at point (52, 0). Create a table to keep track of horizontal and vertical components. Calculate the net force on charge $Q_3 = +50\mu$C which is located at the origin. Since force is a vector, you must specify magnitude and direction.

5. a. Give an example where gravitional potential energy is zero, but the acceleration due to gravity is not zero.

   b. Give an example where the electric potential is zero, but the electric field is not zero.

6. A lightning flash transfers 4.0 C of charge and 4.2×10^6J of energy. Between what potential difference did the flash travel?