

# PHYSICS 1020

## Homework #4

(Due March 15, 2010)

1. (Giancoli 16-1) Calculate the magnitude of the force between two  $3.60\text{-}\mu\text{C}$  point charges  $9.3\text{ cm}$  apart.
2. (Giancoli 16-10) Compare the electric force holding the electron in orbit ( $r = 0.53 \times 10^{-10}\text{ m}$ ) around the proton nucleus of the hydrogen atom, with the gravitational force between the same electron and proton. What is the ratio of these two forces?
3. (Giancoli 16-17, subset) Three charged particles are placed at the corners of an equilateral triangle of side  $1.20\text{ m}$  (Fig. 16-53 in the text). The charges are  $+4.0\text{ }\mu\text{C}$ ,  $-8.0\text{ }\mu\text{C}$ , and  $-6.0\text{ }\mu\text{C}$ . Calculate the magnitude and direction of the net force on the  $+4.0\text{ }\mu\text{C}$  charge due to the other charges.
4. (Giancoli 16-23) What are the magnitude and direction of the electric force on an electron in a uniform electric field of strength  $2360\text{ N/C}$  that points due east?
5. (Giancoli 16-53) A  $3.0\text{-g}$  copper penny has a positive charge of  $+38\text{ }\mu\text{C}$ . What fraction of its electrons has it lost? (Assume the penny is composed entirely of copper.)