PHY 212 General Physics II - Electricity, Magnetism and Light
Summer 2007

Quiz 4 Thursday, July 19

Name:

1. (6 points) The transport of electrons in large molecules has many significant applications. For example, light stimulates the transport of electrons through chlorophyll, the molecule intimately connected to photosynthesis. The conduction of up to 10^6 electrons per second along the axis of segments of the DNA double helix molecule is stimulated by the presence of ruthenium, which binds to ribose, one of the components of the helical DNA strands. What current does this electron transport represent? It is hoped that the development of ways to stimulate electron transport in DNA can lead to the detection of genetic defects and ways of detecting killer viruses, such as the HIV and Ebola viruses. (Hint: charge of an electron is 1.602×10^{-19}C.)

2. (9 points) A wire of length l and cross-sectional area A is melted and recast into a wire of length $3l$ using the same mass of material. (i) What is the new cross-sectional area of the wire? (ii) How is the resisitivity ρ of the wire affected by the change (iii) How is the resistance R of the wire affected by the change? (Hint: $R = \rho l/A$.)