Physics 1B - Midterm #2 Study Guide

This study guide should help you prepare for Midterm #2, covering Chapters 21, 22, and 23 (sections 23.1 – 23.3). The exam will consist of three free-response problems, and each problem will contain three or four parts. Each part will be worth **10 points** and the entire exam will be worth **100 points**. Some parts will require more work than others. You will have to show your reasoning to get full credit. One 3" x 5" index card and a calculator (graphing calculator OK) are permitted**. Notes, books, cell phones, and any other electronics are not allowed.**

The exam will be similar to the homework and to the sample problems from lecture and discussion. However, all of the answers on the midterm will be algebraic rather numerical (i.e., you will be asked to express one variable in terms of other variables). Thus, a calculator is not necessary but may still be helpful. In addition to making sure you understand the concepts, a good way to prepare is to rework some of the homework problems (or do other exercises in the book) algebraically rather than numerically.

The midterm will only contain topics from the following list (though not all of the listed items will show up on the exam). Keep in mind that some of topics that we've covered in class but which do not show up in this list may come up on the cumulative final, so they are still worth learning!

(1) Understanding linear, surface, and volume charge densities.

(2) Evaluating the electric field (both magnitude and direction) due to individual point charges, arbitrary distributions of point charges, and arbitrary continuous charge distributions. Using Taylor series approximation to evaluate electric field in certain limits.

(3) Evaluating the electrostatic potential due to individual point charges, arbitrary distributions of point charges, and arbitrary continuous charge distributions.

(4) Relationship between electric field and electrostatic potential; evaluating the potential and potential difference by integrating the electric field.

(5) Electric field lines.

(6) Gauss's Law: application of Gauss's Law to evaluate the electric field of symmetric charge distributions, either on conductors or insulators, by making assumptions on the direction and magnitude of the electric field from symmetry.

(7) Application of Gauss's Law to conductors; implications for how net charge distributes on conductors, including charged or uncharged conductors containing cavities that may or may not contain additional charge insulated from the conductor.

(8) Electric field inside of conducting material; electrostatic potential inside of conducting material.