Physics 217 Problem Set #3

Due Tuesday, 16 September 2025, in Box.

Submit your solutions by uploading an electronic, or at least legibly-scanned, pdf copy to your personal PHYS 217 Box folder. Note that cell-phone pictures are not usually legible, nor produced in pdf.

Please follow this file-naming convention: **`boxusername_HW#_Phys217.pdf`**, where **`boxusername`** is the name associated with your PHYS 217 Box folder and **#** is the number of the homework assignment. Please also submit your work as **one** pdf file.

Submission, completeness, and correctness will be noted for problems with numbers not bearing asterisks and will add to your Class-Participation grade. You will start these problems in Workshop. You may collaborate with classmates on their solution, inside or outside of class. List in your solutions the names of the classmates with whom you collaborated.

Problems marked with an asterisk will be graded in detail and comprise part of your Homework grade. These are solo efforts; you may not collaborate with classmates on their solution.

1-8. Griffiths problems 2.8, 2.13, 2.16, 2.19. 2.23, 2.24, 2.27, 2.28, and 2.35.

9* An otherwise uniform sphere – radius R, charge density ρ -- contains a spherical, uncharged cavity with radius $R/4$, its center lying a distance $R/2$ from the center of the larger sphere. Calculate the electric field $\boldsymbol{E}$ everywhere.

10* An infinite plane with uniform charge density contains a circular hole, with radius s_0. Calculate the electric field along the axis of the hole, and check that the result converges on expectations at large distances along the axis.

11* A thin circular annulus has inner and outer radii s_0 and $s_0 + d$. The annulus has surface charge density σ. Calculate the electrostatic potential V at the center of the ring.

12* Calculate the electrostatic potential V at the edge of a flat, circular disk with uniform charge density σ and radius s_0. (Note: the integral you get is harder than it looks. You may look it up or compute it numerically this time; make everything under the integral dimensionless if you do.)