Physics 217 Problem Set #5

Due Tuesday, 30 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.

1-6. Griffiths problems 1.61c, 3.6, 3.18, 3.22, 3.26, and 3.27.

7* Two coaxial, conducting, infinite cones have angular radii θ_1 and $\theta_2 > \theta_1$. They are insulated from each other at their common apex. The inner cone carries potential V_0; the outer is grounded. Calculate the potential between the cones. Simplify the result as much as possible.

8* Two conducting spherical shells with radii R_1 and $R_2 > R_1$ are not quite concentric; their centers lie a distance δ apart. The outer shell is grounded; the inner shell carries a total charge q. Calculate the electric potential V between the shells, taking the inter-center δ distance to be small compared to either shell radius, though not zero.

Hint: solve the problem with the centers coincident first, then displace the shells by δ and use the law of cosines to obtain an approximate equation for the outer shell in a coordinate system centered on the inner shell.