

Homework 4

Physics 313

Fall 2026

Due 12:30 PM, Tuesday, 29 September 2026 as an upload to ELMS
All problems are from Griffiths *Introduction to Electrodynamics* 5th Edition

- 1) Griffiths Problem 2.32 [Energy stored in a point charge distribution]
- 2) Griffiths Problem 2.35 [Energy stored in a continuous charge distribution]
- 3) Griffiths Problem 2.36 [An alternative total energy calculation]
- 4) Griffiths Problem 2.37 [Energy stored in electric field]
- 5) Griffiths Problem 2.39 [Concentric conductor shells]
- 6) Griffiths Problem 2.40 [Charges inside conductors]
- 7) Griffiths Problem 2.44 [Capacitance per unit length of coaxial cylinders]
- 8) Griffiths Problem 2.52 [Potential on the rim of a charged disk]

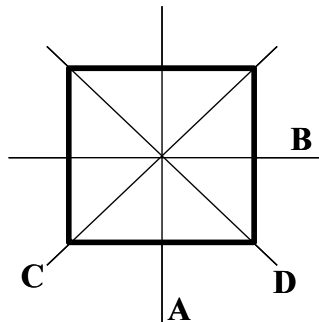
Extra Credit:

Consider the symmetry group of the proper covering operations of a square. This consists of 8 elements:

E = the identity

A, B, C, D = 180° rotations about the corresponding labeled axes in the figure, which are considered fixed in space, not on the square.

F, G, H = clockwise rotations about the z-axis through the center of the square by $\pi/2$, π , and $3\pi/2$, respectively.



- a) From the geometry, work out the multiplication table of the group. Note that each row and column must contain each element of the group once and only once (that's the rearrangement theorem).

- b) Write down all the subgroups (i.e. self-contained groups) of the complete group. Don't forget to include the subgroups $\{E\}$ and $\{E, A, B, C, D, F, G, H\}$, which are the "improper subgroups". Note that the orders of the subgroup must be divisors of 8.