LEARN

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Preface

I believe the best way to learn is to solve problems. Solving a problem one time does not mean you understand it, so I would like to keep a catalog some of problems I solved for future reference.

Part I

TEXTBOOKS

Maxwell's Equations - Dan Fleisch

Sources: Official Website

Chapter 1: Gauss's law for electric fields

1. Find the electric flux through the surface of a sphere containing 15 protons and 10 electrons. Does the size of the sphere matter?

Answer

2. A cube of side L contains a flat plate with variable surface charge density of $\sigma = -3xy$. If the plate extends from $x = 0$to $x = L$ and from $y = 0$ to $y = L$, what is the total electric flux through the walls of the cube?

Answer

3. Find the total electric flux through a closed cylinder containing a line charge along its axis with linear charge density $\lambda = \lambda_0(1 - x/h)$ C/m if the cylinder and the line charge extend from $x = 0$ to $x = h$.

Answer

4. What is the flux through any closed surface surrounding a charged sphere of radius a_0 with volume charge density of $\rho = \rho_0(r/a_0)$, where r is the distance from the center of the sphere?

Answer

5. A circular disk with surface charge density 2×10^{-10} C/m² is surrounded by a sphere with radius of one meter. If the flux through the sphere is 5.2×10^{-2} V · m, what is the diameter of the disk?

Answer