

Workbook



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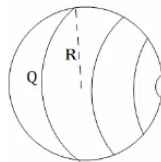
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Gauss's Law

Gauss's Law

Questions

- 1) Find the electric field due to an infinite wire of charge density λ .
- 2) Find the electric field of a uniformly charged spherical shell of radius R and total charge Q .



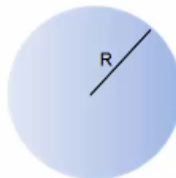
- 3) Find the electric field of an infinite cylinder.
 - a. Assume that it has uniform charge density σ (cylindrical shell).
 - b. Assume that it has uniform charge density ρ (solid cylinder).



- 4) Calculate the electric field due to an infinite plane of uniform charge density σ .



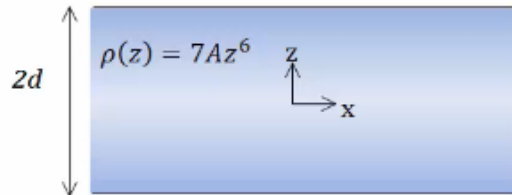
- 5) Find the electric field of a non-uniformly charged sphere of radius R and charge density $\rho(r) = \rho_0 \frac{r}{R}$.



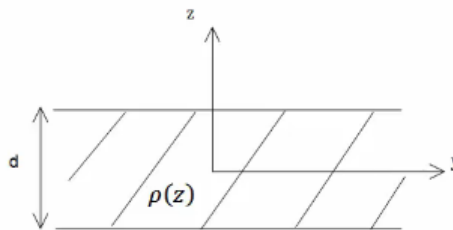
- 6) An infinite plane, of width d , has charge density $\rho(z) = Az$ which is dependent on the distance away from the centre of the plane. A is a constant. What is the electric field?



- 7) An infinite plane, of width $2d$, is charged with charge density $\rho(z) = 7Az^6$, where A is a constant. The z axis is perpendicular to the plane and at its centre.
- What is the electric field?
 - Show that Gauss' law in differential form is applied here.
 - Find the curl, $\vec{\nabla} \times \vec{E}$ of the electric field and explain the result.



- 8) An infinite plane, of width d , has charge density $\rho(z) = Az$ which is dependent on the distance away from the centre of the plane. A is a constant. What is the electric field?



*For the solution go see the videos