



Sheet 4

- 1] Find the charge in the volume defined by $1 \leq r \leq 2$ m in the spherical coordinates, if $\rho_v = 5 \cos^2 \phi / r^4$ C/m³.
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- 2] A circular disk of 4 m radius with a charge density $\rho_s = 12 \sin \phi$ $\mu\text{C}/\text{m}^2$ is enclosed by surface S. what net flux crosses S ?
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- 3] Find the charge in the volume defined by $0 \leq x \leq 1$ m, $0 \leq y \leq 1$ m and $0 \leq z \leq 1$ m , if $\rho_v = 30x^2y$ $\mu\text{C}/\text{m}^3$. What change occurs for limits $-1 \leq y \leq 0$ m?
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- 4] What net flux crosses the closed surface S which contains a charge distribution in the form of a plane disk of radius 4m with a density $\rho_s = \sin^2 \phi / 2r$ $\mu\text{C}/\text{m}^2$.
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- 5] A point charge Q is at the origin of spherical coordinates. Calculate the electric flux Passing through a portion of a sphere shell described by $\alpha \leq \theta \leq \beta$. what is the result when $\alpha = 0$ and $\beta = \pi/2$.
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- 6] A point charge $Q = 30$ nc, is located at the origin in cartesian coordinates. Find the electric flux density D at (1,3,-4,).
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- 7] Two identical uniform line charges lie along the x and y axes with $\rho_l = 20$ $\mu\text{C}/\text{m}$. Obtain \bar{D} and \bar{E} at (3, 3, 3) m.
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- 8] The volume in cylindrical coordinates between $r = 2$ m and $r = 4$ m contains a uniform charge density ρ_v $\mu\text{C}/\text{m}^3$. Use Gauss' law to find D in all regions.
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- 9] The volume in Spherical coordinates has radius $r=a$, and contains a uniform charge density ρ_v $\mu\text{C}/\text{m}^3$. Use Gauss' law to find D. What point charge at origin will result in the same D field for $r > a$?
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