

Physics 161 Fall 2010 Exam 3

Numbers and positions will be changed on the real exam. Closed book closed notes

calculators OK. Enter 0,0 for 0. $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$

A thin rod of length $L=1$ m has charge 0.1 C uniformly distributed.

1&2] What is the x-component of the electric field at point P, in N/C?

3&4] What is the y-component of the electric field at point P, in N/C?

Note: in the real exam, the position of point P will be different.

A half ring of radius 1 m has 0.6C of charge uniformly distributed.

5&6] What is the x component of the E field at a point $z=2$?

7&8] What is the y component of the E field at this point?

9&10] What is the z component of the E field at this point?

In the real exam, the object to be integrated over may be different.

Applications of Gauss' Law

11&12] An infinite plane of charge has a uniform charge density of 0.02 C/m^2 . What is the magnitude of the electric field at a distance of 1 m above the surface?

This may be changed to a sphere or an infinite rod.

13] A hollow conducting shell has a total net charge of 4C on it. The outer radius of the shell is 1m. In the hollow, off center, there is a point charge of 2C. What is the sign of the charge on the surface of the shell?

a) + b) - c) There is no surface charge

14] What is the magnitude of the surface charge, to the nearest coulomb? (0-9).

A brief table of integrals will be provided.