$\mu=10^{-6}$ $n=10^{-9}$ $\varepsilon_0=8.85\times10^{-12}$ $NC^{-2}m^2$
Surface area of sphere = $4\pi r^2$
Volume of sphere=$4/3\pi r^3$

NAME:
GRADE:

1

Quiz for January 26 2005 - Physics 151-001 - Prof. Thomson

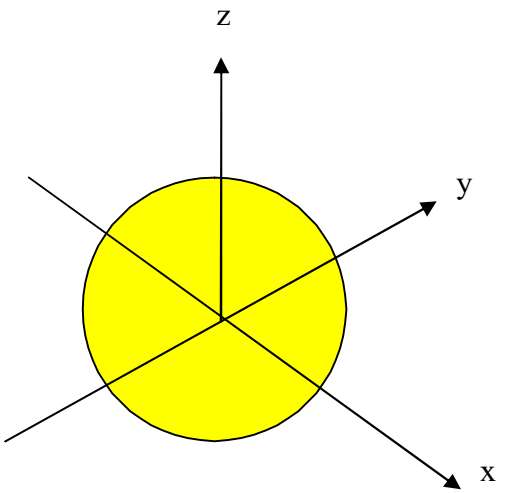
(1 pt)

(1) State Gauss's Law mathematically and explain what it means in words.

(2 pts)

(2) We have a insulating sphere of radius R=3m with uniform volume charge density $\rho=6nC/m^3$.

(a) Use Gauss's Law to derive the electric field strength inside the sphere at a distance r<R.



(2 pts)

(b) Evaluate the electric field due to this ball of charge at x=2,y=0, z=1m

$E_x(2,0,1)=$

$E_y(2,0,1)=$

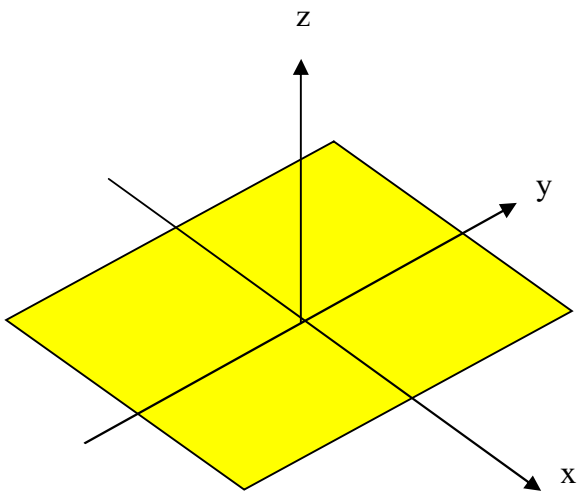
$E_z(2,0,1)=$

Continued overleaf

(3) We have an insulating sheet in the x-y plane with uniform surface charge density σ=4 nC/m^2. The sheet extends to infinity.

(2 pts)

(a) Use Gauss's Law to derive the electric field strength at a distance z from the sheet.



(2 pts)

(b) Evaluate the electric field due to this sheet at the point x=2, y=0, z=1 m.

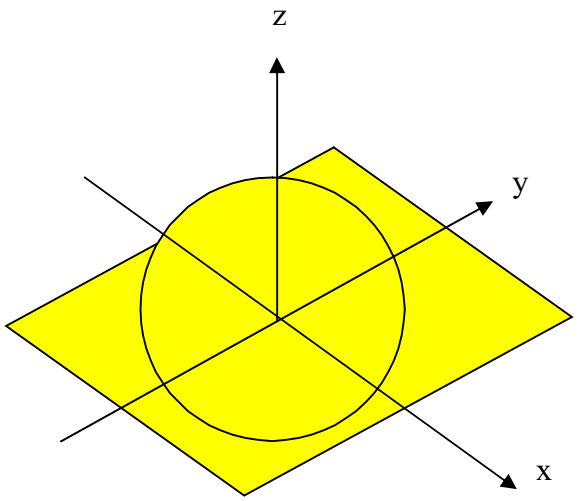
$E_x(2,0,1)$=

$E_y(2,0,1)$=

$E_z(2,0,1)$=

(1 pt)

(4) Now the two charge distributions are superimposed. Find the resultant electric field at x=2, y=0, z=1 m.



$E_x(2,0,1)$=

$E_y(2,0,1)$=

$E_z(2,0,1)$=