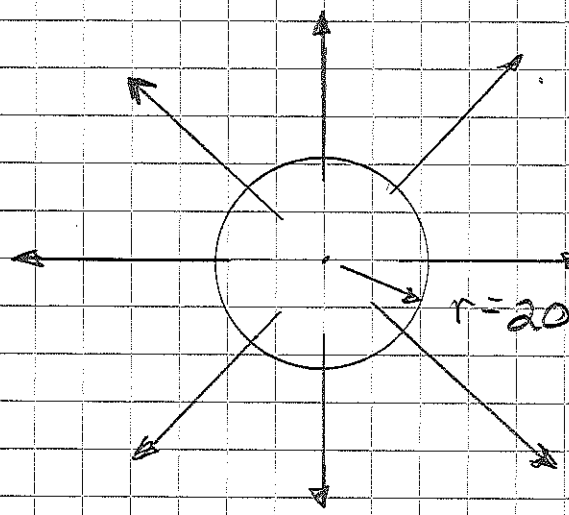

$$\vec{E} = 5000 r^2 \hat{r} \ \frac{N}{C}$$

a.) For $r = 20\,cm$:

$$|\vec{E}| = \underline{200\ N/m}$$

b.) For $r = 40\,cm$ sphere:

$$\Phi_e = \oint \vec{E} \cdot d\vec{A} = \oint E\,dA \qquad \text{since } E \parallel dA \text{ everywhere}$$

$$= E \oint dA \qquad E = \text{const at a given } r$$

$$= E\,4\pi r^2$$

So $\Phi_e = (5000 r^2)\,4\pi r^2$

$= 4\pi (5000 r^4)$ for $r = 20\,cm$

$= \underline{1.00.5\ N/C}$

c.) Gauss' law:

$$\Phi_e = \frac{Q_{in}}{\varepsilon_0} \Rightarrow Q_{in} = \varepsilon_0 \Phi_e$$

$$= 8.897 \times 10^{-10} C$$

$$= \underline{0.8897\ nC}$$