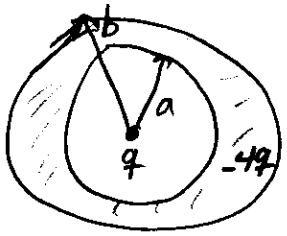
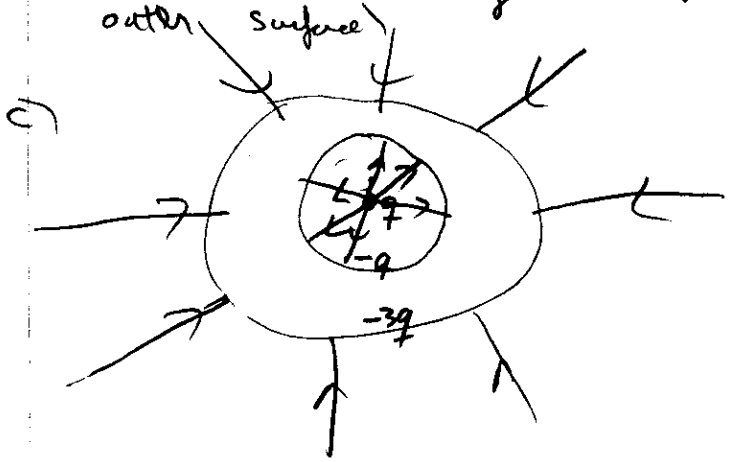
(4)



a) In order for $E=0$ inside conductor, gauss's law tells us that for a gaussian surface within conductor must have no net charges within, therefore $-q$ on inner surface

b) Outside surface has remaining negative charge of $-3q$ (or total charge see from without $= -3q$, seen on outer surface)

c)



d) $r > b$ $\quad \oint \vec{E} \cdot d\vec{A} = \frac{1}{\varepsilon_0} Q_{enc}$

$$E\,4\pi r^2 = \frac{1}{\varepsilon_0}(-3q)$$

$$E = \frac{(-3q)}{4\pi r^2 \varepsilon_0} \quad \text{(towards center)}$$

e) $E\,4\pi r^2 = \frac{1}{\varepsilon_0}(q)$ $\quad (r < a)$

$$\Rightarrow E = \frac{q}{4\pi\varepsilon_0 r^2}$$

f) $a < r < b$ $\quad E = 0$ within conductor

g) $V(r)$