If $r=d$

duh

$E=0$

If $d<r<e$

$E=0$

If $r=e$

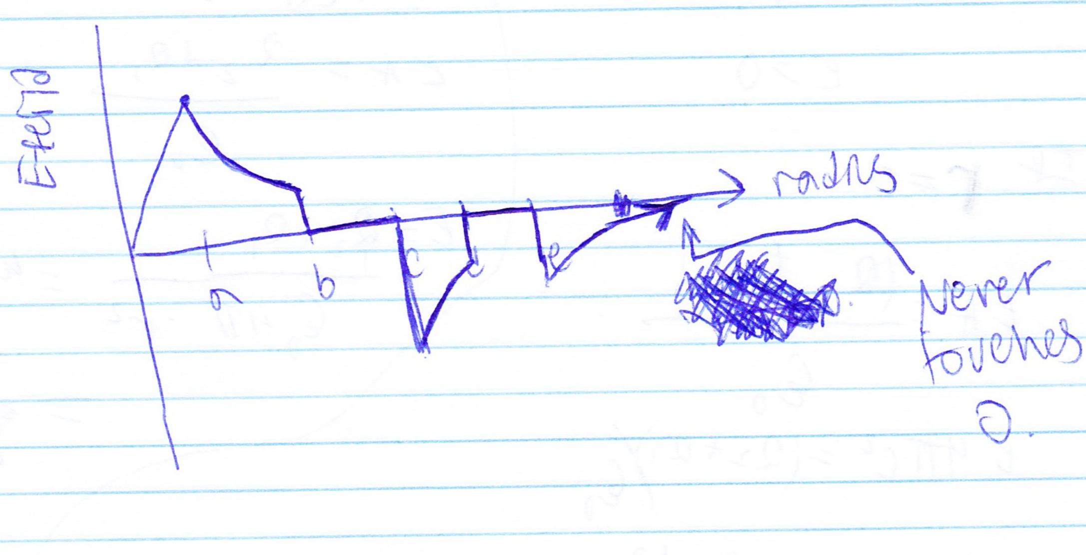
$$E * 4\pi r^2 = \frac{(Q_3+Q_2+Q_1)}{\varepsilon_0}$$

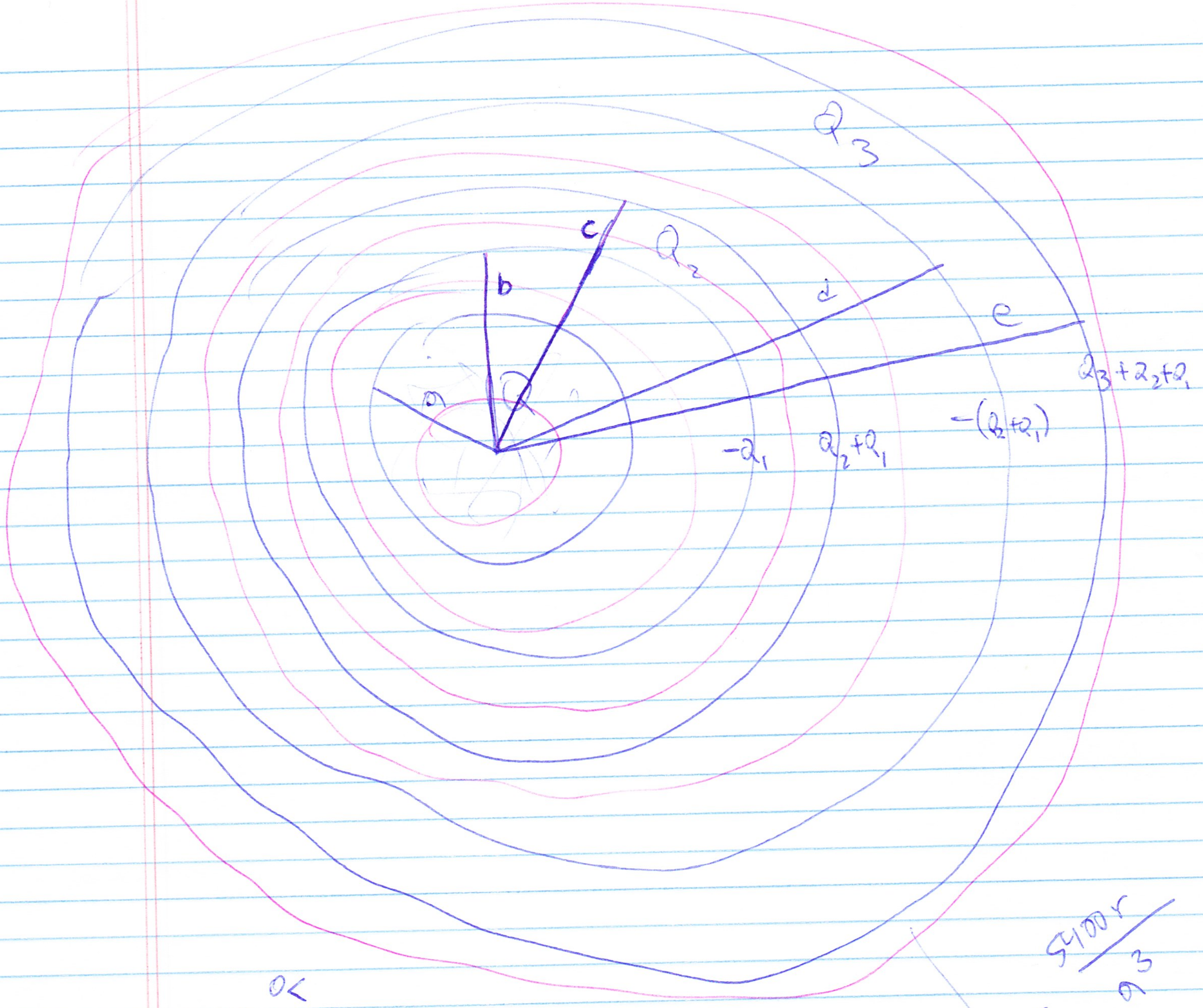
$$E = \frac{Q_3+Q_2+Q_1}{\varepsilon_0 4\pi e^2} = \frac{k(Q_3+Q_2+Q_1)}{e^2}$$

$$= \frac{-9000}{e^2}$$

If $r>e$

$$\frac{k(Q_3+Q_2+Q_1)}{r^2} = \frac{-9000}{r^2}$$






If $0 < r < a$

$$\rho = \frac{Q_1}{V} = \frac{Q_1}{\frac{4}{3}\pi a^3} \qquad \rho \cdot V = Q$$

$$\frac{Q_1}{\frac{4}{3}\pi a^3} \cdot \frac{4}{3}\pi r^3 = Q = \frac{Q_1 r^3}{a^3}$$

$$E \cdot 4\pi r^2 = EA = \frac{Q}{\varepsilon_0} = \frac{Q_1 r^3}{a^3 \varepsilon_0}$$

$$E = \frac{Q_1 r^3}{a^3 \varepsilon_0 4\pi r^2} = \boxed{\frac{Q_1 r}{a^3 \varepsilon_0 4\pi}} = \boxed{k\frac{Q_1 r}{a^3}} \ \#$$

$$= \frac{5400 r}{a^3}$$

If $r = a$

$$E\,4\pi r^2 = \frac{Q_1}{\varepsilon_0}$$

$$E = k\,\frac{Q_1}{a^2} = \frac{5400}{a^2}$$

If $a < r < b$

$$E \cdot 4\pi r^2 = \frac{Q_1}{\varepsilon_0}$$

$$E = k\,\frac{Q_1}{r^2} = \frac{5400}{r^2}$$

If $r = b$

$$EA = \frac{0}{\varepsilon_0}$$

$$E \cdot \text{const} = 0$$

$$E = 0$$

charge inside cancels with charge on inner surface of shell

If $b < r < c$

shell has no E field within its conductor

$$EA = k\,\frac{Q_1}{r^2}$$

$$EA = \frac{k \cdot 0}{r^2}$$

$$E = 0$$

If $r = c$

$$EA = \frac{(Q_2 + Q_1)}{\varepsilon_0}$$

$$E\,4\pi c^2 = (Q_2 + Q_1)/\varepsilon_0$$

$$= k\,\frac{Q_2 + Q_1}{c^2} = \frac{-36000}{c^2}$$

If $c < r < d$

$$EA = \frac{Q_2 + Q_1}{\varepsilon_0}$$

$$E = \frac{Q_2 + Q_1}{\varepsilon_0 4\pi \cdot r^2} = \frac{k(Q_2 + Q_1)}{r^2} = \frac{-36000}{r^2}$$