Electrostatics Review

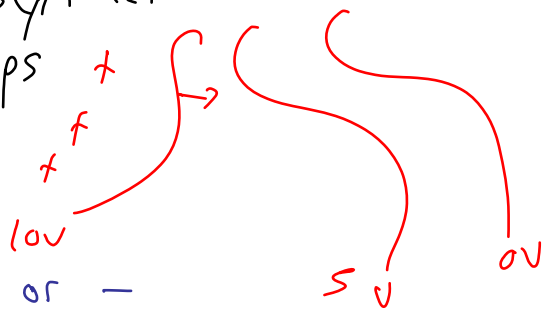
I. main Types of Problems

(A) Point q's

(B) Gauss's Law: symmetric Q

(C) Equipotential maps

(D) Distribution, λ



II. General

(A) Two types, + or −

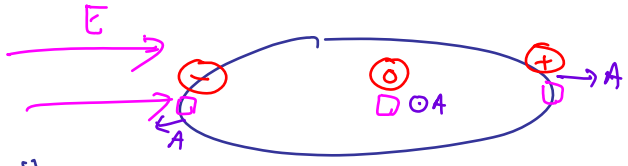
(B) Insulators / Conductors

(C) Methods of charging

1. Friction
2. Conduction
3. Induction

(D) $E_x = -\frac{dV}{dx} \iff \Delta V = -\int E \cdot dx$

(E) Flux: $\Phi_E = E \cdot A \quad (+, -, 0)$



(F) Capacitance

1. $C = \frac{Q}{\Delta V}$ (Farads, F)

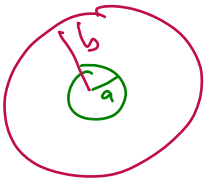
2. Series: $\frac{1}{C_{eq}} = \sum_i \frac{1}{C_i}$; same Q on each plate

3. parallel: $C_{eq} = \sum_i C_i$; ΔV same across each capacitor

4. $C = \kappa C_0$, dielectric

5. $U = \frac{Q^2}{2C} = \frac{Q\Delta V}{2} = \frac{1}{2} C \Delta V^2$

6. $C_{plates} = \frac{\epsilon \cdot A}{d}$; $C_{shells} = \frac{ab}{k(b-a)}$



(G) $\Delta U = -q_0 \int E \cdot ds$

(H) $\Delta V = \frac{\Delta U}{q_0} = -\int E \cdot ds$

III. Point Charges

(A) $F = \frac{k q_1 q_2}{r^2}$

(B) $E = \frac{F}{q} = \frac{kQ}{r^2}$ (vector)

(C) $V = \frac{kQ}{r}$ (scalar, + & −)

(D) $U = \frac{k q_1 q_2}{r}$

(E) Field Lines & Equipotentials