

# Electrostatic Potential

- Reminder: **Electric Field** = electric force acting on a probe charge  $q$ , divided by  $q$ :

$$\vec{E} = \frac{\vec{F}_{elect}}{q}$$

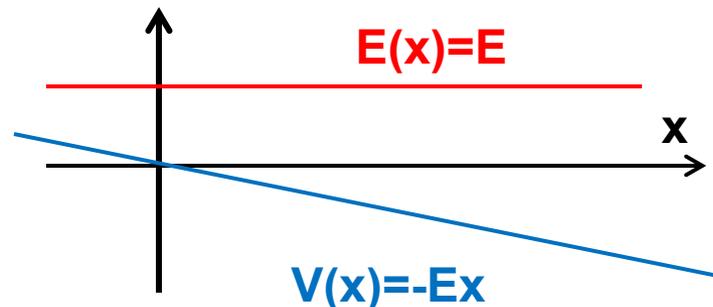
- Similarly, **Electrostatic Potential** = electrostatic potential energy divided by charge. It is also known as Voltage, since SI unit of potential is Volt (V):

$$V = \frac{U_{elect}}{q}$$

- **Example.** Consider constant electric field  $E(x)=E$ , (as inside a capacitor). Potential energy change = - Work:

$$\Delta U_{elect} = -F_{elect} \Delta x = -Eq \Delta x$$

$$V(x) = \frac{U_{elect}}{q} = -Ex$$



# Homework

**Problem 1:** A capacitor is made of two parallel metallic plates separated by distance  $h$ . There is vacuum inside. An electron enters the capacitor moving parallel to the plates with speed  $u$ . Due to the electric field, its trajectory bends towards the positive plate. Find the minimal voltage  $V$  that needs to be applied to the capacitor so that electron hits the plate before escaping. The length it needs to travel across the capacitor to exit is  $L$  (see the Figure for details). Electron charge and mass are  $e$  and  $m$ , respectively.

