Potential Energy

Point Charge $U = \frac{kqQ}{r}$

V = electric potential

$V = \frac{U}{q}$

$\Delta V = \frac{\Delta U}{q}$

$\Delta V = -\int_{\infty}^{r} \vec{E} \cdot d\vec{r}$

Electron Volt

electron-volt : amount of kinetic energy gained by an electron when it accelerates through one volt of potential

$\Delta KE = -\Delta U = -(q\Delta V) = -(-e)(1\ \text{V})$

1 electron-volt = 1 eV = 1.602×10^{-19} J

Infinite Line Charge

$\Delta V = \frac{-\lambda}{2\pi\varepsilon_0} \ln\left(\frac{r_f}{r_0}\right)$

Equipotential Curves + Surfaces

- an equipotential is any curve or surface along which $\Delta V = 0$
- example: perpendicular to uniform $\vec{E}$

$|\vec{E}| = \frac{-\Delta V}{\Delta r} = \frac{-dV}{dr}$

$\vec{E} = \frac{-dV}{dx}\hat{i} - \frac{dV}{dy}\hat{j}$