## **Electric Potential of a Charged Plane Sheet**



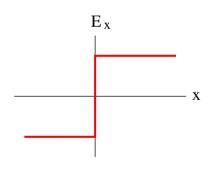
Consider an infinite plane sheet perpendicular to the x-axis at x=0. The sheet is uniformly charged with charge per unit area  $\sigma$ .

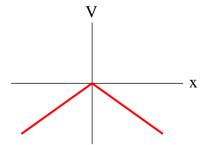
- Electric field (magnitude):  $E=2\pi k|\sigma|=\frac{|\sigma|}{2\epsilon_0}$
- Direction: away from (toward) the sheet if  $\sigma > 0$  ( $\sigma < 0$ ).
- Electric field (x-component):  $E_x = \pm 2\pi k\sigma$ .
- Electric potential:

$$V = -\int_0^x E_x dx = \mp 2\pi k \sigma x.$$

• Here we have used  $x_0 = 0$  as the reference coordinate.

positively charged sheet





negatively charged sheet

