"I would like to go over the process of integration with the infinite line of charge example again in class if possible.."

Summation becomes an integral (be careful with vector nature)

$$\vec{E} = \sum_i k \frac{Q_i}{r_i^2} \hat{r}_i \qquad \longrightarrow \qquad \vec{E} = \int k \frac{dq}{r^2} \hat{r}$$
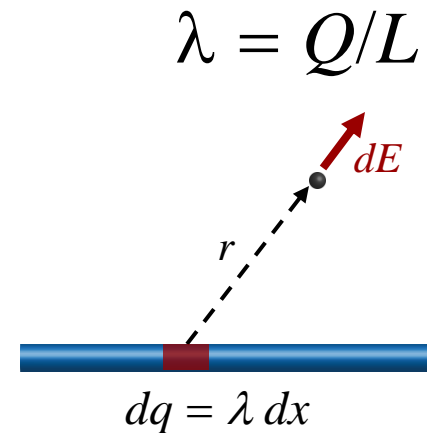
WHAT DOES THIS MEAN ?

Integrate over all charges (dq)

r is vector from dq to the point at which E is defined

Linear Example:

$$\lambda = Q/L$$

pt for E •

dE

r

charges ●●●●●●●

$$dq = \lambda \, dx$$

30