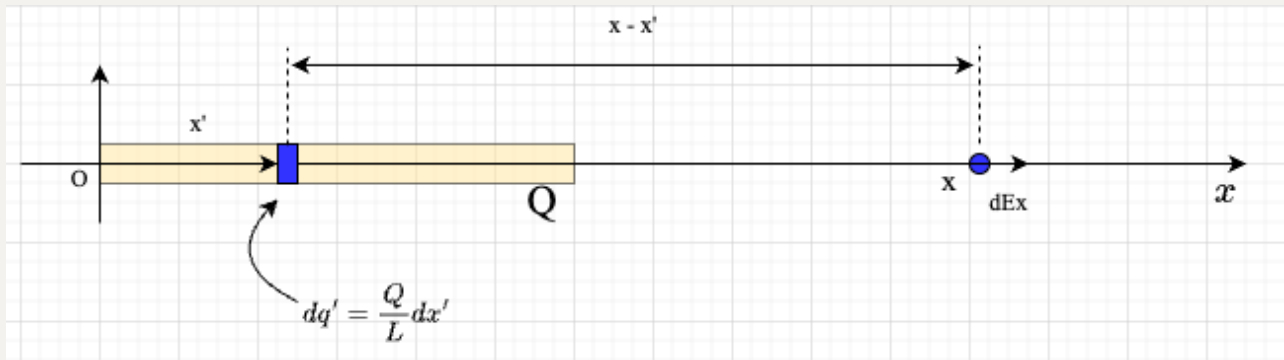


Physics 261: Class 10

More about functions, Pluto, and plotting

Part 1: The electric field from a charged stick on the x axis

Consider a uniformly charged stick which extends from the origin to $x = L$, and has total charge Q . The charge per unit length is therefore $\lambda(x) = Q/L$ and is independent of position.



a) Write down an expression for the electric field dE_x at a distance x from the origin.

b) to compute the electric field at x we need to integrate the result from (a) over all chunks of charge in the stick; i.e. from $x = 0$ to $x = L$. Perform this integration and write down the theoretical value from the electric field $E(x)$.

Part 2: Computing and visualizing the electric potential and electric field of a dipole

Now suppose we have a dipole on the x -axis. It consists of a charge $-q$ at $(-1, 0)$ m and a charge $+q$ at $(1, 0)$ m. At some general point (x, y) , write down an expression (a) for the total electric potential and (b) the total electric field due to the contributions from each charge of the dipole.