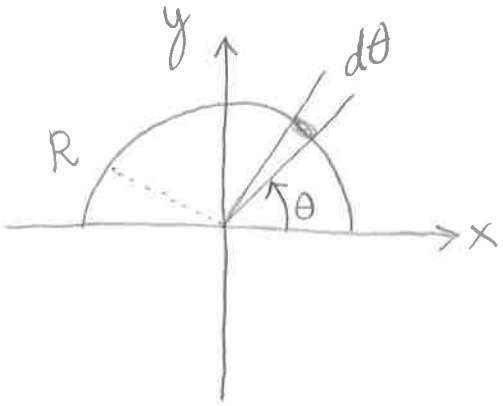
Quiz 3

Consider a non-uniformly charged semicircle with charge density $\lambda(\theta) = \alpha\theta^2$, where α is a positive constant. What is the magnitude dE of the electric field produced at the center of the circle by a small section $d\theta$ of the semicircle located at the angle θ? The radius is R.



(a) $\frac{1}{4\pi\varepsilon_0}\frac{\alpha\theta^2}{R^2}d\theta$

(b) $\frac{1}{4\pi\varepsilon_0}\frac{\alpha\theta^2}{R}d\theta$

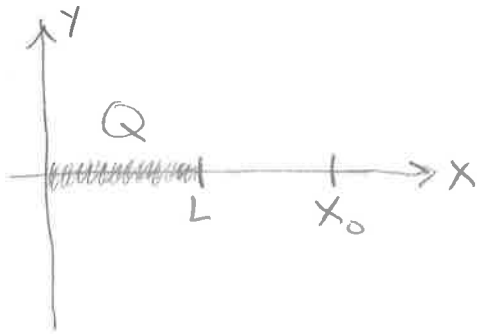
(c) $\frac{1}{4\pi\varepsilon_0}\frac{\alpha\theta^2}{R^2}\cos\theta\, d\theta$

(d) $\frac{1}{4\pi\varepsilon_0}\frac{\alpha\theta^2}{R^2}\sin\theta\, d\theta$

(e) None of above

Quiz 3

Consider a total charge Q uniformly distributed along the x-axis from $x=0$ to $x=L$. What is the electric field at the point $x_0 > L$ on the x-axis?



(a) $\int_0^L \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{L}\right)\frac{1}{L^2}\,dx$

(b) $\int_0^L \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{L}\right)\frac{1}{x^2}\,dx$

(c) $\int_0^L \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{L}\right)\frac{1}{(x-x_0)^2}\,dx$

(d) $\int_L^{x_0} \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{L}\right)\frac{1}{L^2}\,dx$

(e) None of above