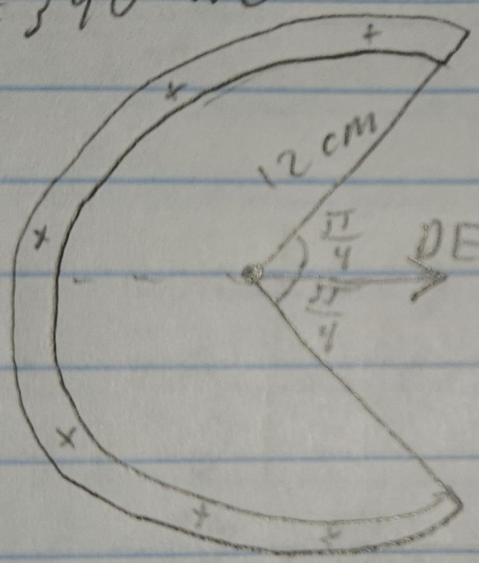
9/14/23

Quiz 2

Josiah Schmitz

$Q = 390\ nC$



$E_y = 0 \quad \theta = \frac{3\pi}{2}$

$\frac{DQ}{D\theta} = \frac{2Q}{3\pi} \quad DQ = \frac{2Q}{3\pi} D\theta$

$DE_x = \frac{K DQ}{R^2} \sin\theta = \frac{K 2Q}{3\pi R^2} \sin\theta \, D\theta$

$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{(9\cdot10^9)(2)(390\cdot10^{-9})}{3\pi(0.12)^2} \sin\theta \, D\theta$$

$= 51,725\left(\sin\frac{\pi}{4} - \sin\frac{-\pi}{4}\right)$

$= 51,725\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\right) = 51,725(\sqrt{2})$

$= \boxed{73,150 \ \frac{N}{C} \ \hat{x}}$