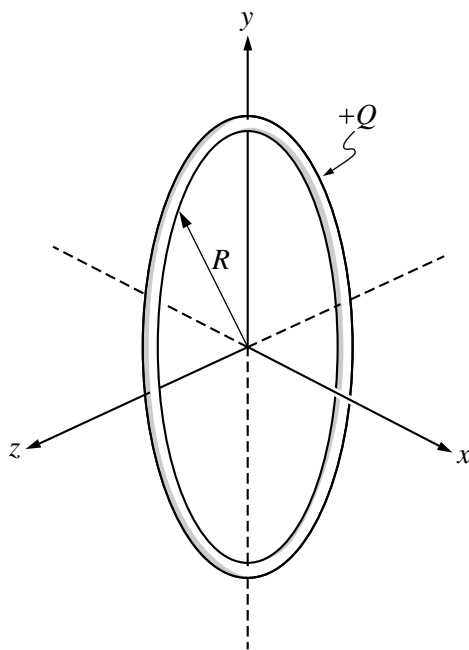


1999 PHYSICS C—E & M



E&M 3. The nonconducting ring of radius R shown above lies in the yz -plane and carries a uniformly distributed positive charge Q .

(a) Determine the electric potential at points along the x -axis as a function of x .

(b) i. Show that the x -component of the electric field along the x -axis is given by

$$E_x = \frac{Qx}{4\pi\epsilon_0(R^2 + x^2)^{\frac{3}{2}}}.$$

ii. What are the y - and z - components of the electric field along the x -axis?

(c) Determine the following.

i. The value of x for which E_x is a maximum

ii. The maximum electric field $E_{x \text{ max}}$