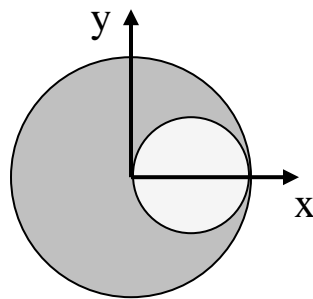


2

- (a) A solid insulating sphere of radius R is centered on the origin and originally has a charge Q evenly distributed throughout its volume. A smaller spherical cavity of radius $R/2$, centered on the point $(R/2, 0, 0)$, is now carved out of the original sphere. The remaining charge is then evenly distributed throughout the remaining insulating material.

What is the magnitude and direction of the electric field at the point $(R,0,0)$?



Cross section of sphere at $z = 0$.
(z -axis out of page)

- (b) A line charge of λ coulombs/meter is glued to the rim of a wheel of radius R . The wheel is suspended in the horizontal plane so that it is free to rotate about its vertical symmetry axis. A constant magnetic field B_0 is initially present parallel to the wheels symmetry axis, and the wheel is initially motionless. The magnetic field is now ramped linearly down to zero over a time Δt .

What is the final angular momentum of the wheel?

