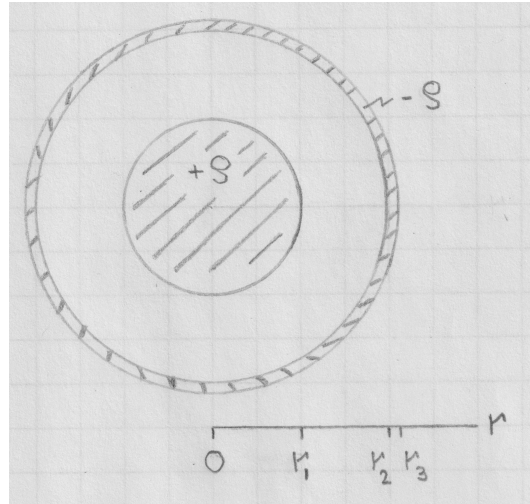


[lex46] Electric field of uniformly charged concentric spheres

Consider (as shown in cross section) a solid sphere of radius  $r_1$  surrounded by a spherical shell of inner radius  $r_2 = 2r_1$  and outer radius  $r_3$  to be determined. The sphere is uniformly charged with positive charge density  $+\rho$  and the shell with negative charge density  $-\rho$ .

- (a) Determine the electric field  $E(r)$  for  $0 < r < r_1$  and for  $r_1 < r < r_2$ .
- (b) Determine the value of  $r_3$  such that the electric field vanishes at  $r > r_3$ .
- (c) Determine the electric field  $E(r)$  for  $r_2 < r < r_3$ .

Express all results in terms of  $\rho$  and  $r_1$ .



**Solution:**