2. The volume charge density of a spherical charge distribution is given by \( \rho(r) = \rho_0 e^{-\alpha r} \), where \( \rho_0 \) and \( \alpha \) are constants. What is the electric field produced by this charge distribution as function of \( r \).

23.27 •• A thin spherical shell with radius \( R_1 = 3.00 \) cm is concentric with a larger thin spherical shell with radius \( R_2 = 5.00 \) cm. Both shells are made of insulating material. The smaller shell has charge \( q_1 = +6.00 \) nC distributed uniformly over its surface, and the larger shell has charge \( q_2 = -9.00 \) nC distributed uniformly over its surface. Take the electric potential to be zero at an infinite distance from both shells. (a) What is the electric potential due to the two shells at the following distance from their common center: (i) \( r = 0 \); (ii) \( r = 4.00 \) cm; (iii) \( r = 6.00 \) cm? (b) What is the magnitude of the potential difference between the surfaces of the two shells? Which shell is at higher potential: the inner shell or the outer shell?