Home Work 4/5

1. Figure 24-42 shows a thin plastic rod of length L = 12.0 cm and uniform positive charge Q = 56.1 fC lying on an x axis. With V = 0 at infinity, find the electric potential at point P_1 on the axis, at distance d = 2.50 cm from one end of the rod.

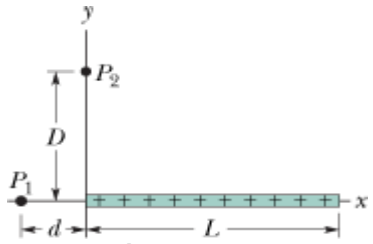
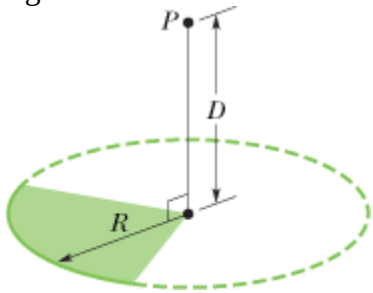


Figure 24-42

2. A plastic disk of radius R = 64.0 cm is charged on one side with a uniform surface charge density σ = 7.73 fC/m^2, and then three quadrants of the disk are removed. The remaining quadrant is shown in Fig. 24-45. With V = 0 at infinity, what is the potential due to the remaining quadrant at point P, which is on the central axis of the original disk at distance D = 25.9 cm from the original center?



3. The thin plastic rod of length L = 10.0 cm in Fig. 24-42 has a nonuniform linear charge density $\lambda = cx$, where c = 49.9 pC/m^2. (a) With V = 0 at infinity, find the electric potential at point P_2 on the y axis at $y = D$ = 3.56 cm. (b) Find the electric field component E_y at P_2. (c) Why cannot the field component E_x at P_2 be found using the result of (a)?

4. Figure 25-43 displays a 12.0 V battery and 3 uncharged capacitors of capacitances C_1 = 4.00 μF, C_2 = 6.00 μF, and C_3 = 3.00 μF. The switch is thrown to the left side until capacitor 1 is fully charged. Then the switch is thrown to the right. What is the final charge on (a) capacitor 1, (b) capacitor 2, and (c) capacitor 3?

5. The parallel plates in a capacitor, with a plate area of 8.50 cm^2 and an air-filled separation of 3.00 mm, are charged by a 6.00 V battery. They are then disconnected from the battery and pulled apart (without discharge) to a separation of 8.00 mm. Neglecting fringing, find (a) the potential difference between the plates, (b) the initial stored energy, (c) the final stored energy, and (d) the work required to separate the plates.