3.) A head is (approximately) a conducting sphere of radius 10 cm. What is the capacitance of the head? What will be the charge on the head if, by means of a Van De Graaf generator, you raise the potential on the head to 100,000 V? What voltage would be required to cause electrostatic break down in air, |E⃗ | = 3 × 106 volts/m? Now assume that we place a sharp object with radius of curvature r = 0.1 mm in electrical contact with your head to that it forms a series circuit with your head. What are the answers to the questions above now?

6.) You have a parallel plate capacitor of area A, gap d and two dielectric materials of constants κ1 and κ2. You only have enough of each material to fill 1/2 of the capacitor volume. Which arrangement maximizes the capacitance? Why?

k1 k2

$$κ\_{1}$$

$$κ\_{2}$$