

# Practice Problem Set 5

## 1. Wolfson 22.57

### 2. Energy Stored in a Capacitor

A potential of 100V is applied across the plates of a parallel plate capacitor via a battery (plate separation of 1.0cm). The capacitor has a capacitance of 5.0pF ( $1\text{F}=10^{12}\text{pF}$ ). a) What is the energy stored in the capacitor in this configuration? b) Now disconnect the battery and move the plates 2.0cm apart. What is the energy stored in the capacitor now? (HINT: you can show this by using just the formulas, without calculations) Assume an arbitrary charge  $Q$  on the capacitor plates. c) Suppose, instead, that the battery is left connected, and the plates are again moved until they are 2.0cm apart. What is the energy stored in the capacitor now?

### 3. Uniformly Charged Spherical Shell

Find the energy of a uniformly charged spherical shell of total charge  $Q$  and radius  $R$ . (HINT: the relationship  $dV = R dA$  may be useful, also think about what integrating over  $dA$  actually yields).