

## Homework set 1:

Please return these problems on Monday Oct. 5 the latest. Numbered problems are from Jackson, 3. ed.

**2-10** (the “boss” is a hemisphere extending into the gap), **2-14**, and problem 1 below:

**Problem 1**

A thin metal sphere with radius  $b$  has charge  $Q$ .

- (a) What is its capacitance?
- (b) What is the energy density at distance  $r$  from the sphere’s center?
- (c) What is the total energy of the electric field?
- (d) How much work did it take to charge the sphere to  $Q$  by bringing the charge in from infinity?
- (e) Now we place another thin conducting sphere within the first sphere, the inner has radius  $a$ . Their potential difference is  $V$ . Find  $a$  so that the electric field at the inner sphere’s surface is minimized.