

Name: \_\_\_\_\_

CWID: \_\_\_\_\_

**Calculators Not Allowed**  
**No Work = No Credit**  
**Write Legibly**

Question	Points	Score
1	10	
2	10	
Total:	20	

1. 10 points An experimentalist observes a particle of charge  $q$ , mass  $m$ , and energy  $qV_o$  moving in a circular orbit of radius  $r_o$  inside a **spherical** capacitor with inner radius  $a$  and outer radius  $b$ , see Fig. (1).

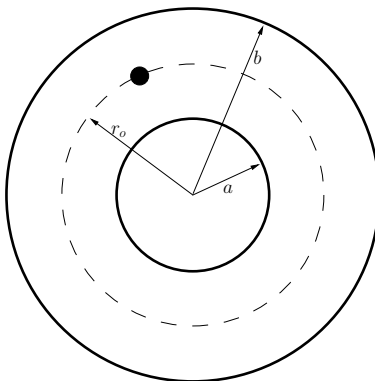


Figure 1: A particle of charge  $q$ , mass  $m$ , and energy  $qV_o$  moving inside a **spherical** capacitor is shown.

The experimentalist quickly observes that the particle only moves in a circular orbit with radius  $r_o$  when  $V_a - V_b$  has a very special value. Find this value. **Start with Gauss's Law.**

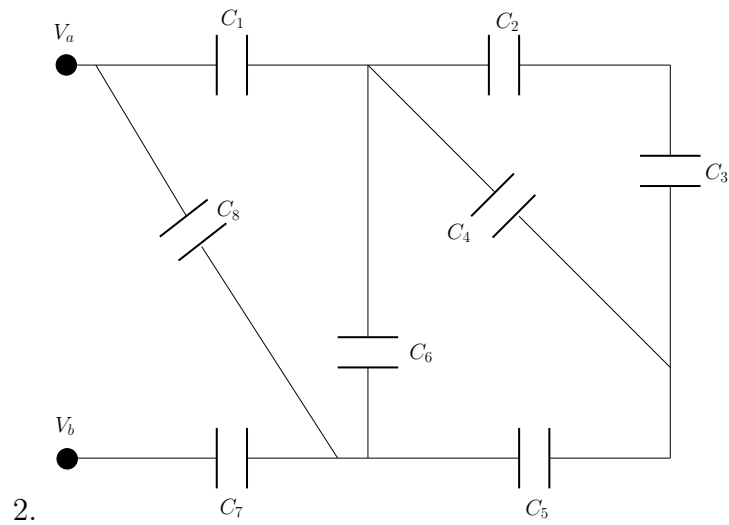


Figure 2: A capacitor network is shown.

- (a) 7 points Find the equivalent capacitance,  $C_{eq}$ , of the circuit shown in Fig. (2). You may use  $\perp$ ,  $\parallel$  symbolism.

- (b) 3 points Give formulas for computing  $a \perp b$  and  $a \parallel b$ .