Hints to Online HW05

1. **Exercise 24.11.** (a) \( C = \frac{\phi}{\Delta V} \) (b) \( C = 4\pi\varepsilon_0 \left( \frac{ab}{b-a} \right) \). Solve for \( a \). (c) Gauss' law.

2. **Exercise 24.3.** (a) \( C = \frac{\phi}{\Delta V} \) (b) \( C = \varepsilon_0 \frac{A}{D} \). Solve for \( A \). (c) Gauss' law. (d) \( \sigma_0 = \frac{Q}{A} \).

3. **Exercise 24.26.** (a) \( U_e = \frac{1}{2} CV^2 = \frac{1}{2} QV = \frac{Q^2}{2} C \). In this case \( Q \) is unchanged. (b) In this case, \( V \) is unchanged.

4. **Exercise 24.28.** Perform circuit reduction. Use \( C_s = \frac{C_1C_2}{C_1+C_2} \) to find effective capacitance, use \( C = \frac{Q}{V} \), and work back to find the rest. For energies, use any of the 3 formulas in hints to #3. Note: charge same on each cap.

5. **Exercise 24.29.** Perform circuit reduction. Use \( C_p = C_1 + C_2 \) to find effective capacitance, use \( C = \frac{Q}{V} \), and work back to find the rest. For energies, use any of the 3 formulas in hints to #3. Note: voltage same on each cap.

6. **Exercise 24.17.** Perform circuit reduction. Find \( C_{eff} \), then do reverse hops to find \( Q \), \( \Delta \) and \( |U_e| \), as needed. See worked examples, week 06a.

7. **Problem 24.67.** Expand middle metal plate into a neutral metal H-shaped island. What does the capacitor combo look like now? (Don't forget your K's!) #