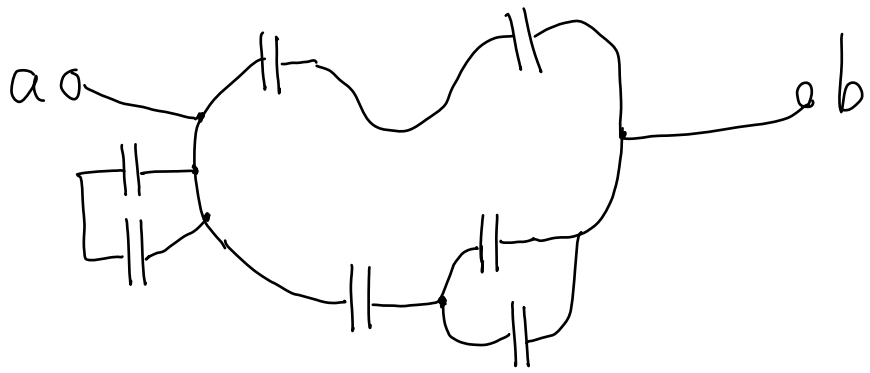
Problem 1
A capacitor consists of two circular plates of radius 5 cm and separation 1.2 mm. (a) Estimate the capacitance. (b) If the field toward the middle of the capacitor is 25 V/m, estimate the charge on the capacitor plates.

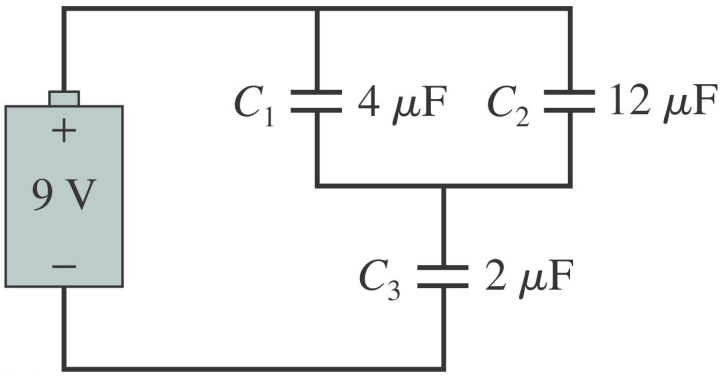
Problem 2
A parallel-plate air capacitor of capacitance 400 pF has a charge ± 500 nC. The plates are 2 mm apart. Find (a) the potential difference, (b) the plate areas, (c) the electric field between the plates, and (d) the surface charge density of the plates.

Problem 3
(a) For capacitors $C_1 = 8\mu F$ and $C_2 = 6\mu F$, find their capacitance in series and in parallel. (b) Find the charge and voltage difference on each capacitor when they are connected in series with a 12 V battery. (c) Find the charge and voltage difference on each capacitor when they are connected in parallel with a 12 V battery.

Problem 4
The figure below gives a circuit containing a number of capacitors, each of capacitance C = 6 μF. Find the capacitance between the terminals a and b.



Problem 5
What are the charge on and potential difference across each capacitor in the figure below.



Problem 6
Ch 24 # 23

Problem 7
Ch 24 # 87

Problem 8
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Problem 9
The voltage across a 100 μF capacitor takes the following values. Calculate the expression for the current through the capacitor in each case.

a. $v_C(t) = 40\cos(20t - \pi/2)$ V

b. $v_C(t) = 20\sin 100t$ V

c. $v_C(t) = -60\sin(80t + \pi/6)$ V

d. $v_C(t) = 30\cos(100t + \pi/4)$ V

Problem 10
The current through a 250-mH inductor takes the following values. Calculate the expression for the voltage across the inductor in each case.

a. $i_L(t) = 5\sin 25t$ A

b. $i_L(t) = -10\cos 50t$ A

c. $i_L(t) = 25\cos(100t + \pi/3)$ A

d. $i_L(t) = 20\sin(10t - \pi/12)$ A