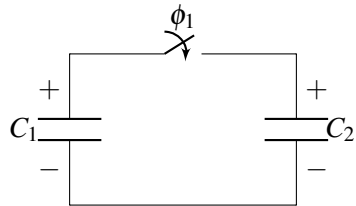


EECS 16A Designing Information Devices and Systems I

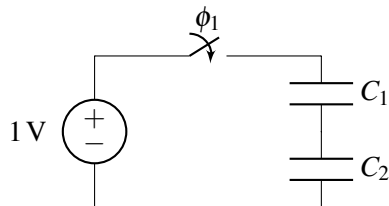
Summer 2020 Discussion 4C

1. Capacitors and Charge Conservation

- (a) Consider the circuit below with $C_1 = C_2 = 1 \mu\text{F}$ and an open switch. Suppose that C_1 is initially charged to $+1 \text{ V}$ and that C_2 is charged to $+2 \text{ V}$. How much charge is on C_1 and C_2 ?



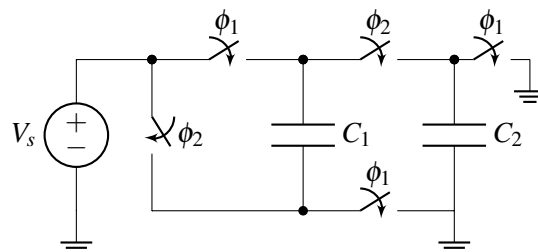
- (b) Now the switch is closed (i.e. the capacitors are connected together.) What are the voltages across and the charges on C_1 and C_2 ?
- (c) Consider the following circuit with $C_1 = 1 \mu\text{F}$ and $C_2 = 3 \mu\text{F}$. Suppose that both capacitors are initially uncharged (0 V).



What are the voltages across each capacitor after the switch is closed? What are the charges on each capacitor?

2. Charge Sharing Algorithm

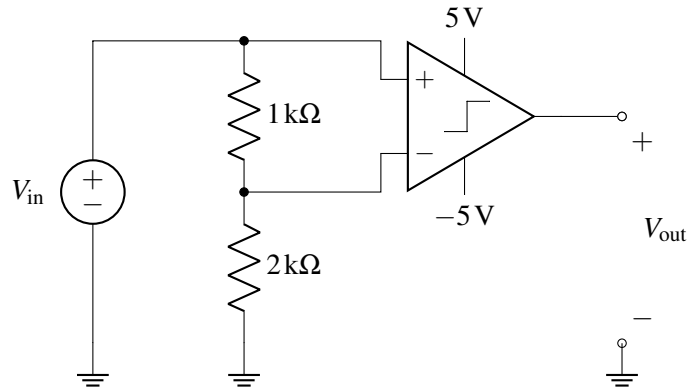
For the switch capacitor circuit below, calculate the value of all node voltages at the end phase 2, as a function of the voltage source V_s and the capacitors C_1, C_2 .



3. Practice: Comparators

For each of the circuits shown below, plot V_{out} for V_{in} ranging from -10V to 10V for part (a) and from 0V to 10V for part (b).

(a)



(b)

