Name: ____________________
SID: ____________________
UID: ____________________

Problem 1 ________ Points of 25
Problem 2 ________ Points of 25
Problem 3 ________ Points of 25
Problem 4 ________ Points of 25
Score ________ %

- Closed book, closed notes
- One pocket calculator permitted (no PDAs, laptops, cell phones, or other electronic devices)
- Show derivations to get partial credit in case of numerical errors
- Cross out incorrect attempts (no partial credit for ambiguous derivations)
- Write results into boxes
- Take off hats or caps and leave backpacks and electronic devices in isle

Password: Submit Reload

1. Capacitor C_1 in the circuit below is discharged at $t = 0$. Use $V_1 =$ V, $R_1 =$ kΩ and $C_1 =$ nF. Calculate

a) the energy stored on the capacitor at time $t = 0$.

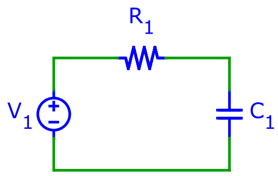
5 pts.
0

b) the energy stored on the capacitor at time $t \to \infty$.

5 pts.
1

c) the total energy delivered by the source V_1 for $t = 0 \ldots \infty$.

15 pts.
2



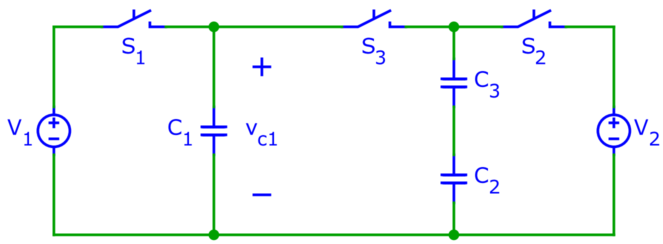
2. In the circuit below, all switches are initially open and the capacitors discharged. At time $t = 0$, switches S_1 and S_2 are closed. At time $t_1 > 0$ S_1 and S_2 are opened and switch S_3 is closed. Use $V_1 =$ V, $V_2 =$ V, $C_1 =$ pF, $C_2 =$ pF and $C_3 =$ pF and assume that all capacitors are discharged before closing switches S_1 and S_2. Calculate

a) The total charge delivered by the sources to C_1, C_2, and C_3 at $t = 0$.

10 pts.
3

b) The voltage v_{c1} for $t > t_1$.

15 pts.
4

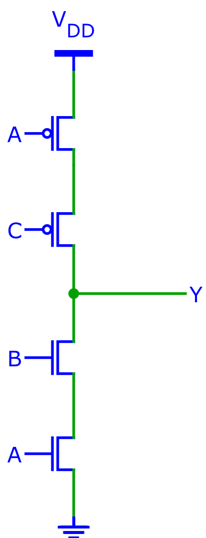


3. The circuit below is a partial implementation of a logic gate that computes the output Y from inputs A, B, and C.

   a) (15 points) Add transistors as needed to complete the implementation such that for all binary input combination the output is either connected to V_{dd} or ground but not both.

   b) (10 points) Fill out the truth table of the logic gate for all possible inputs.

A	B	C	Y
0	0	0	
0	0	1	



4. In the circuit below switch S_1 is open for $t < 0$ and the current through $L_1 =$ mH is zero. At time $t = 0$ the switch closes, and reopens at time $t = T_1$. Calculate T_1 such that the voltage across $R_1 =$ Ω just after the switch reopens is $v_R(t = T_1) =$ V. Use $V_1 =$ V.

$T_1 =$ [ ] 25 pts. 5