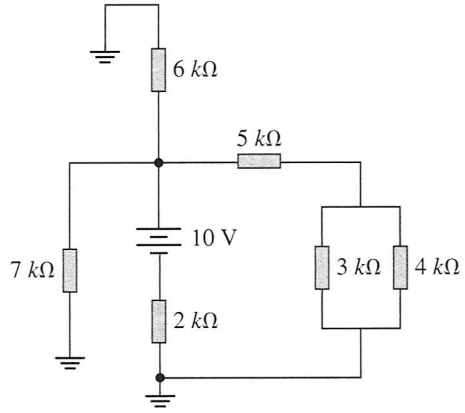
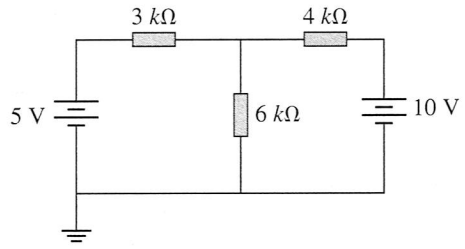
1-21. Using analysis by inspection, write the expression for the voltage across the 2 $k\Omega$ resistor and solve for its value.



Mixing Voltage and Current Divider Analysis

1-22. Find I_{6k}.



Hint: When we have two power supplies and a linear (resistive) network, we solve in three steps.

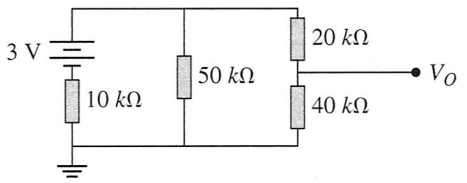
(1) Set one power supply to 0 V and calculate current in the 6 $k\Omega$ resistor from the nonzero power supply.

(2) Reverse the power supply roles and recalculate I_{6k}.

(3) The final answer is the sum of the two currents.

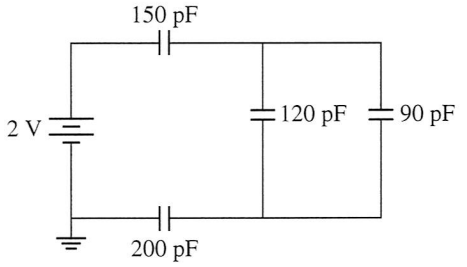
This is known as the superposition theorem and can be applied only for linear elements.

1-23. Solve for V_O using a method of inspection (current divider, voltage-divider, or both).



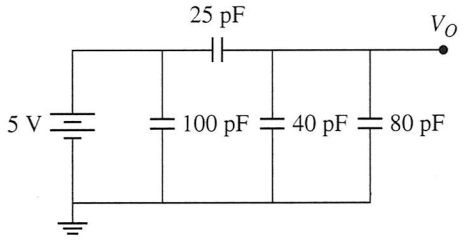
Capacitors

1-24. Find the equivalent capacitance at the input nodes and calculate the charge–discharge energy W for the parallel capacitors.

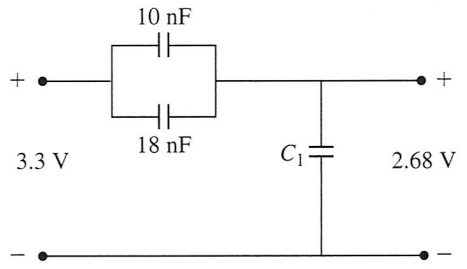


1-25. **(a)** What is the energy W needed to charge the circuit?

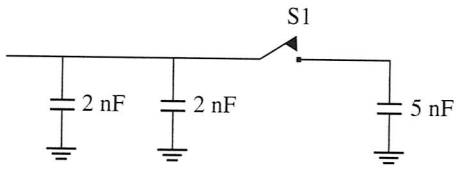
(b) Write the capacitance voltage divider expression for V_O and solve for the value.



1-26. Find C_1 and the energy to charge C_1.

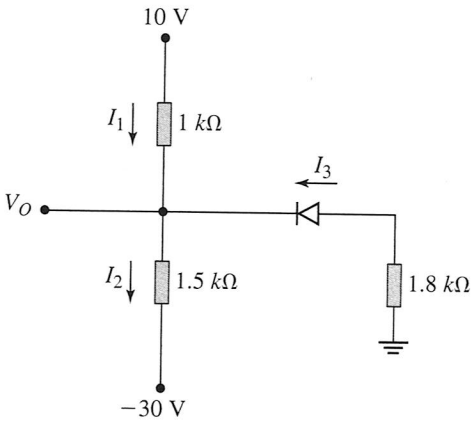


1-27. The 2 nF capacitors are precharged to 3 V, and the 5 nF capacitor is precharged to 1.2 V. At $t = 0$, switch S1 closes. What is the final voltage?

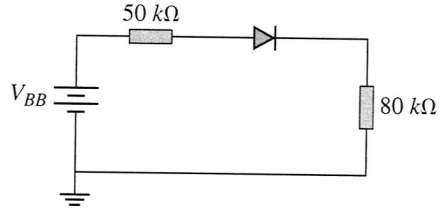


Diodes

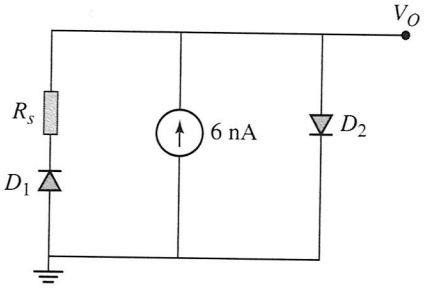
1-28. Calculate V_O and the current through each resistor. Assume that the forward bias diode voltage is 0.7 V.



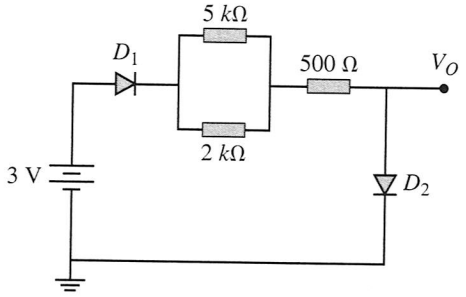
1-29. Given that $I_S = 10$ nA. Calculate I_D and V_D for (a) $V_{BB} = 1$ V and (b) $V_{BB} = 10$ V.



1-30. Calculate V_O given that the reverse bias saturation current $I_S = 1$ nA and you are at room temperature.



1-31. Diode D_1 has a reverse bias saturation current of $I_{s1} = 1$ nA, and diode D_2 has $I_{s2} = 4$ nA. At room temperature, what is V_O?



1-32. Calculate the voltage across the diodes given that the reverse bias saturation current in D_1 is $I_{s1} = 175$ nA, and $I_{s2} = 100$ nA.