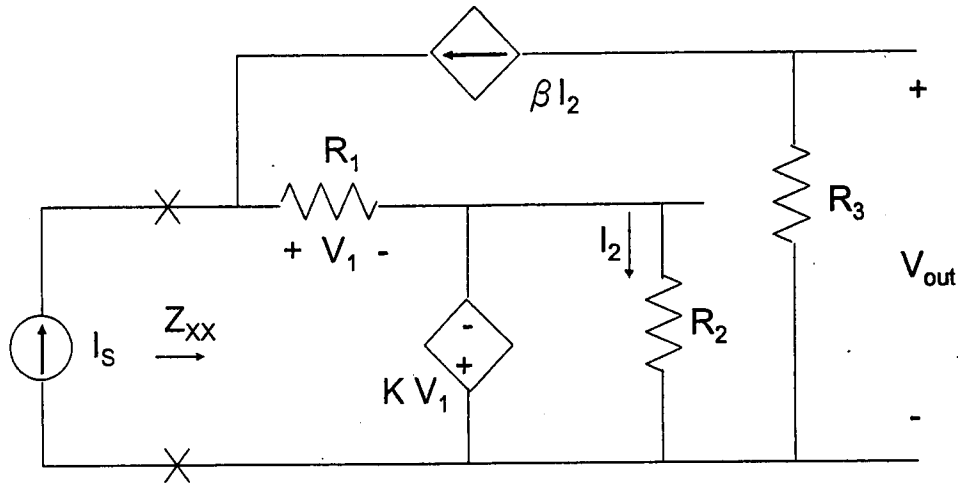
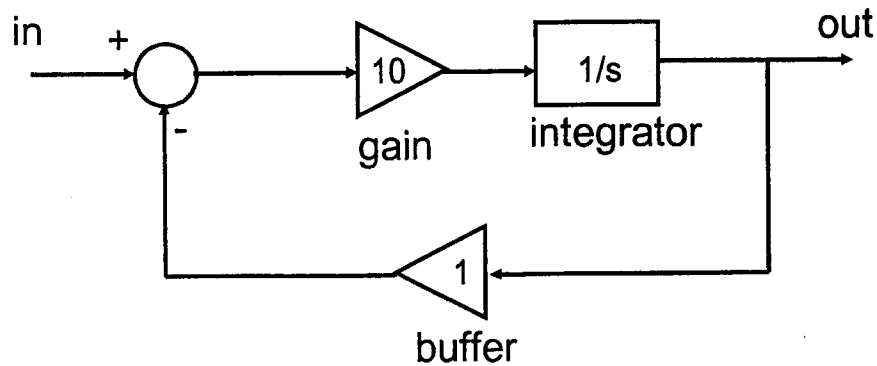


1. Consider the two stage feedback system shown below.

- A. Find the driving point impedance Z_{XX} looking into terminal X-X in terms of device parameters R_1, R_2, R_3, K, β (note: it is possible that not all the parameters are used in Z_{XX}). (7%)
- B. Find the gain V_{out}/I_S in terms of device parameters R_1, R_2, R_3, K, β . (8%)



2. You are given several μA 741 operational amplifiers, $10k\Omega$ and $100k\Omega$ resistors, $10\mu F$ capacitors to build up a feedback control loop with a block diagram shown below. Please construct a circuit diagram with the devices given above to implement the control approach. (note: you should label all the device parameters and input, output ports in your circuit). (20%)



(背面仍有題目, 請繼續作答)

3. A simple one phase AC network with AC source by voltage V_G is connected in series with transmission line represented by an inductor L_T , the transmission line feeds a parallel RL load.

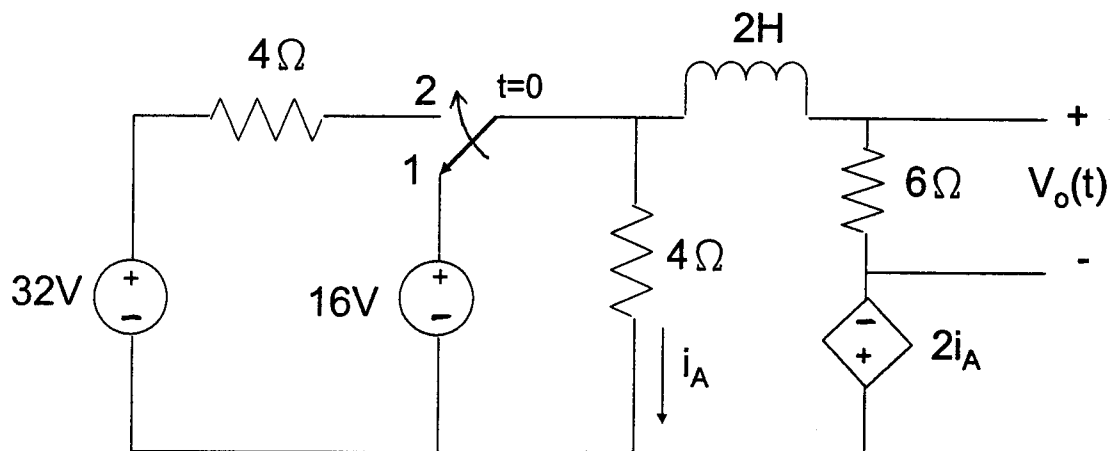
A. Draw the circuit diagram. (2%)

B. Demonstrate that adding a small parallel capacitor to a parallel RL load raises the load voltage at V_L . (8%)

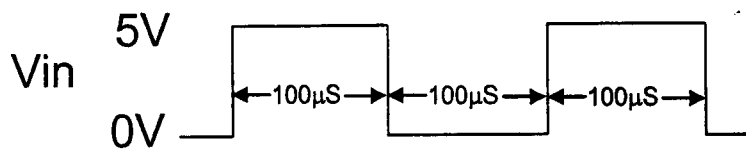
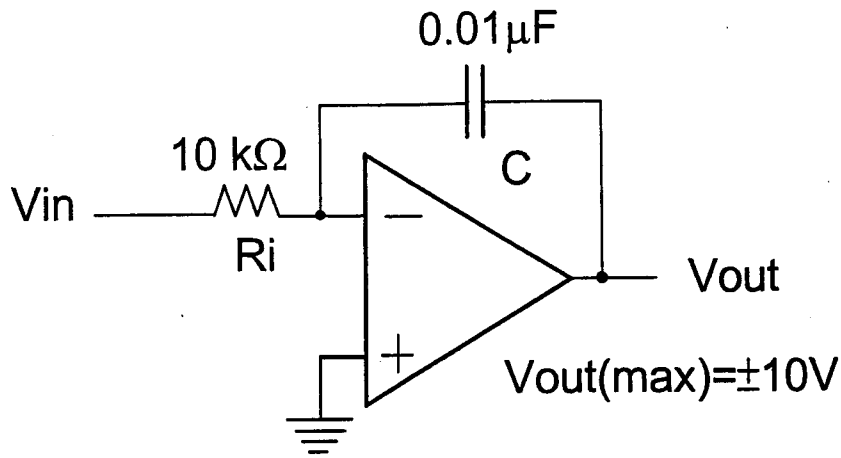
4. The circuit shown below has reached steady state with the switch in position 1. At time $t = 0$, the switch moves from position 1 to position 2.

A. Find the voltage $V_o(t)$ for $t > 0$. (10%)

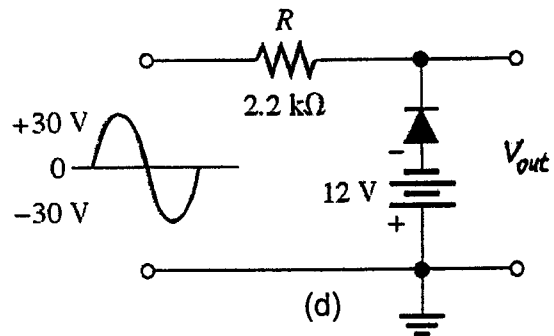
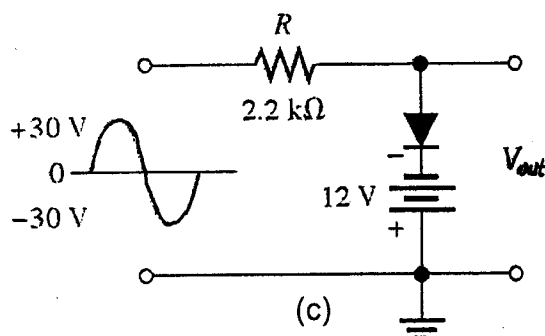
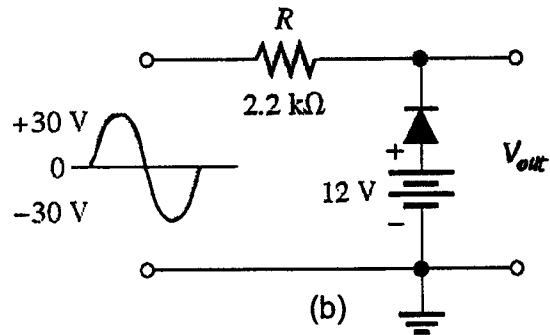
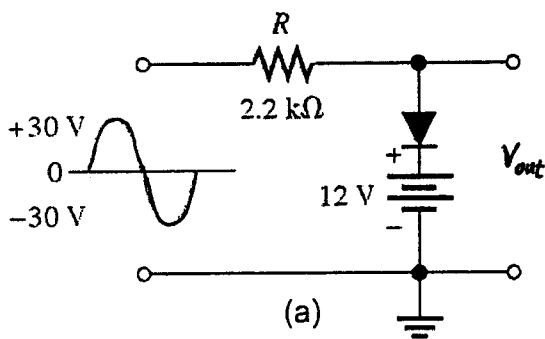
B. Find the current i_A for $t > 0$. (5%)



5. Plot the output voltage waveform, V_{out} , with the input voltage waveform, V_{in} , as shown below. (10%)

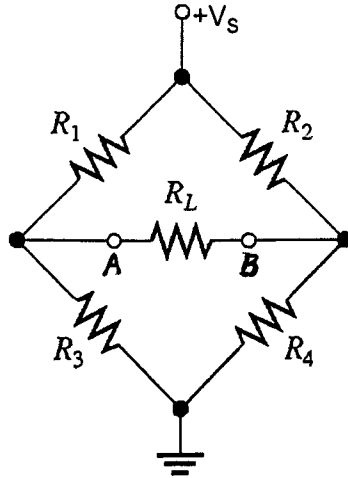


6. Plot the output voltage waveforms, V_{out} , of the following figures (a), (b), (c), and (d), respectively. Note: the diode forward voltage $V_F = 0.7V$. (10%)



(背面仍有題目, 請繼續作答)

7. Find the Norton equivalent circuit looking into terminals A and B of the following bridge circuit. DO NOT derive this Norton equivalent circuit from Thevenin equivalent circuit. (10%)



8. Find the currents flowing through R3 and R2, respectively, of the following circuit. (10%)

