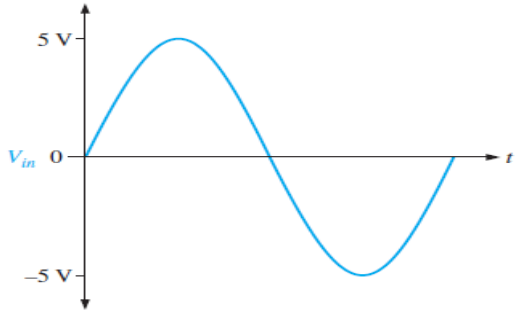
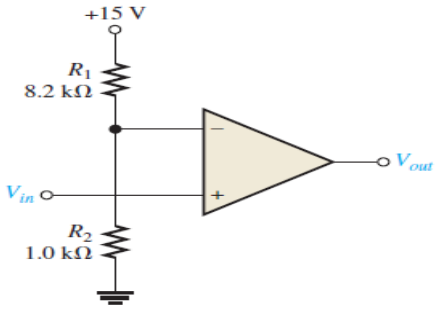
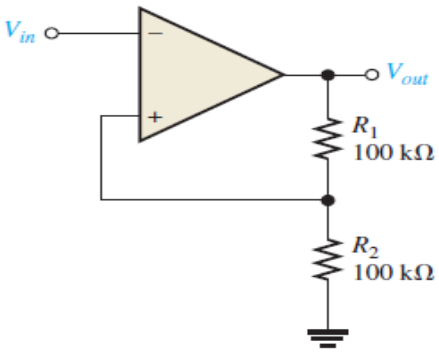
Faculty of engineering at shoubra **Communication department** **ECE-322: Electronic Circuits (B)**		**Dr. Ahmad El-Banna** **Semester : Spring 2017** **Sheet :3** **Basic Op-Amp Circuits**

1. The input signal is applied to the comparator in Figure.
Draw the output showing its proper relationship to the input signal.
Assume the maximum output levels of the comparator are =±14 V.

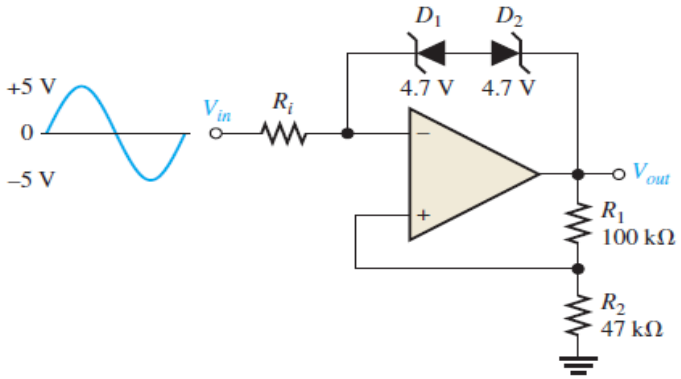




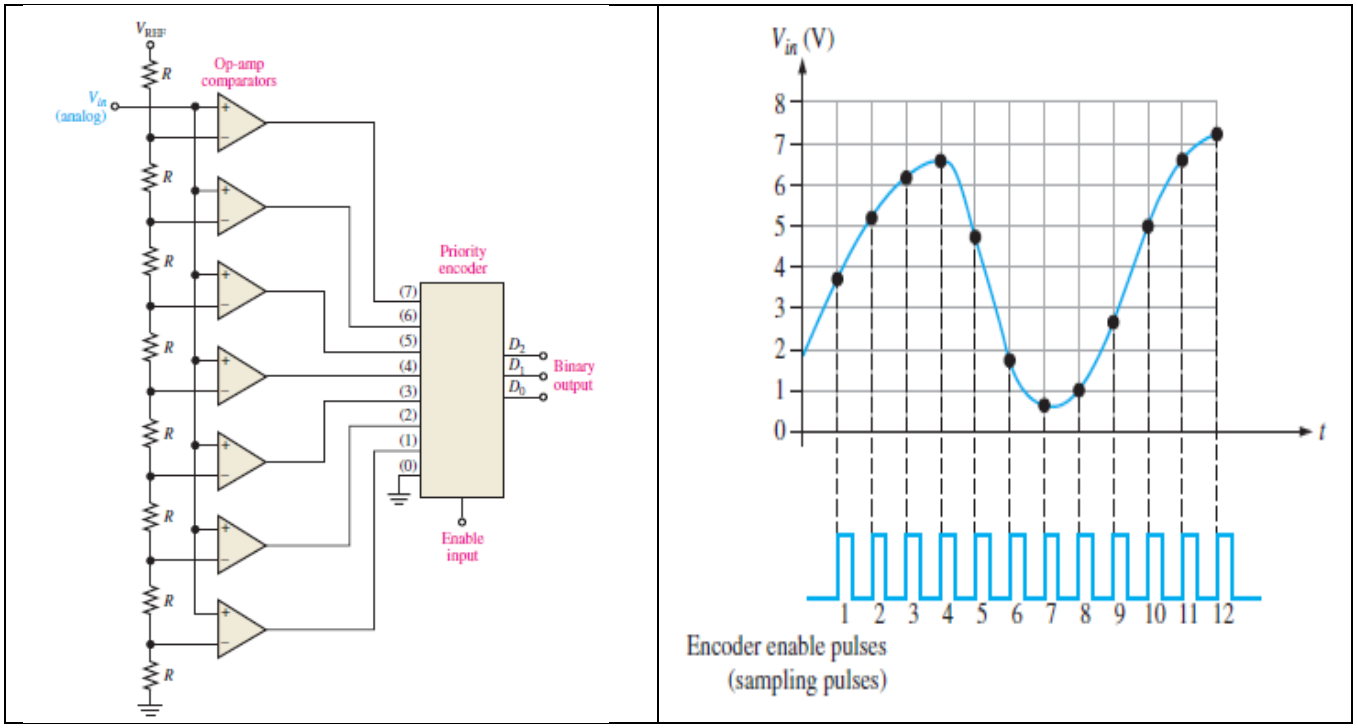
2. Determine the upper and lower trigger points for the comparator circuit in Figure. Assume that $+V_{out(max)} = +5$ V and $-V_{out(max)} = -5$V.



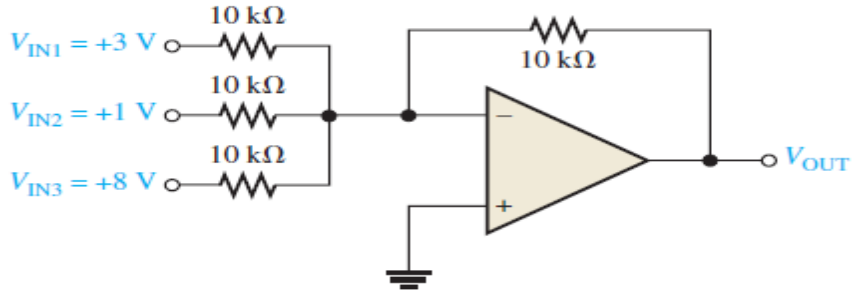
3. Determine the output voltage waveform for Figure



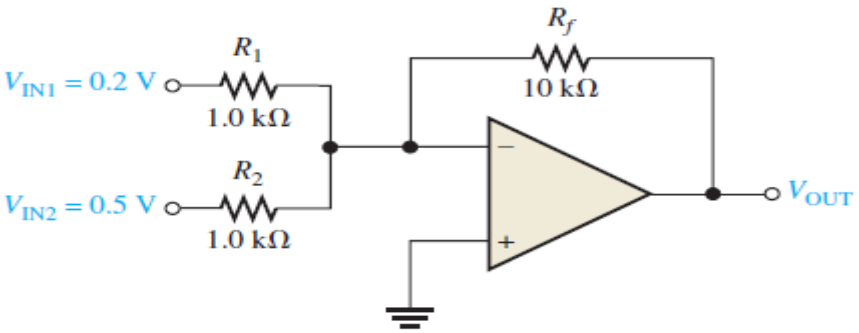
4. Determine the binary number sequence of the three-digit simultaneous ADC in Figure for the input signal in Figure and the sampling pulses (encoder enable) shown. Draw the resulting digital output waveforms.



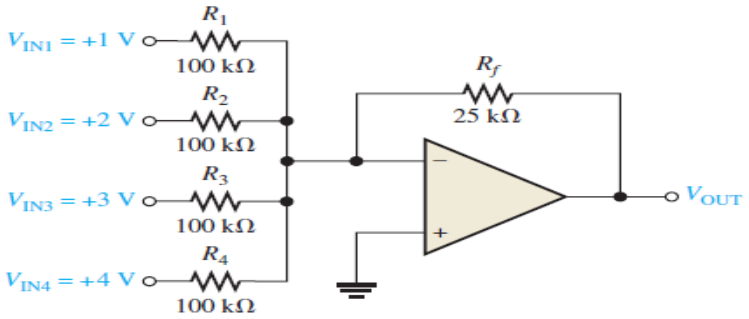
5. Determine the output voltage in Figure



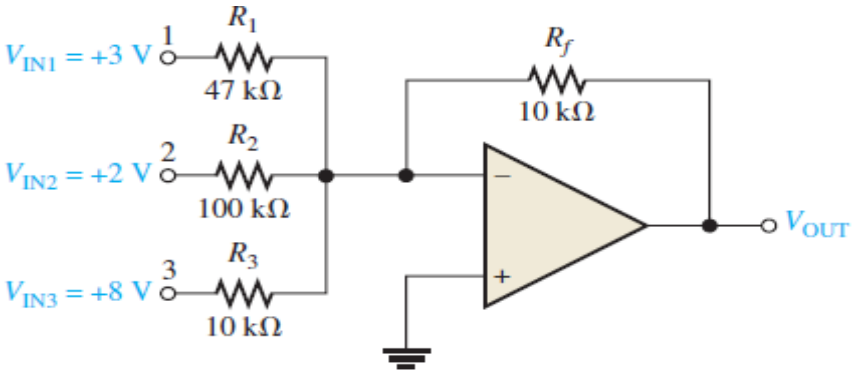
6. Determine the output voltage for the summing amplifier in Figure



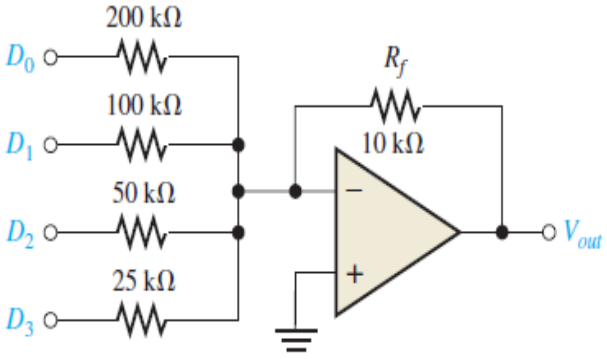
7. Show that the amplifier in Figure produces an output whose magnitude is the mathematical average of the input voltages.



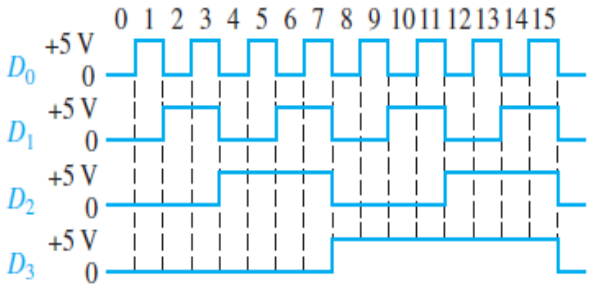
8. Determine the weight of each input voltage for the scaling adder in Figure and find the output voltage.



9. Determine the output voltage of the DAC in Figure(a). The sequence of four digit binary codes represented by the waveforms in Figure(b) are applied to the inputs. A high level is a binary 1, and a low level is a binary 0. The least significant binary digit is D0.

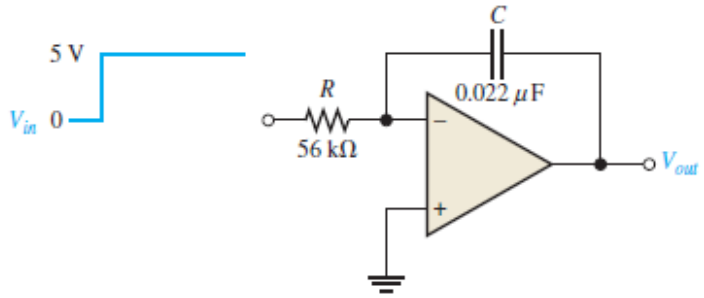


(a)

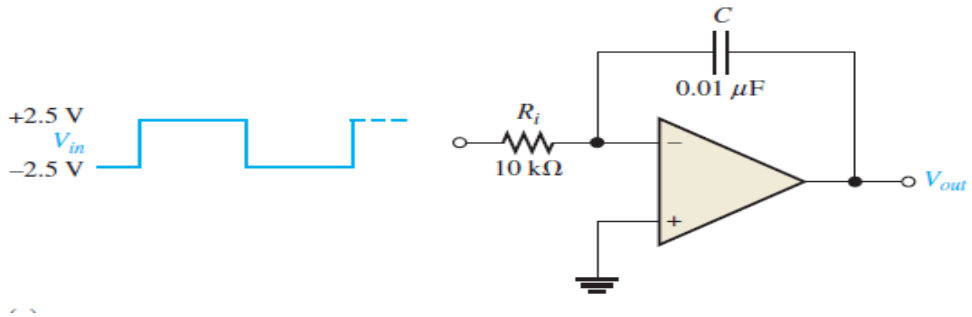


(b)

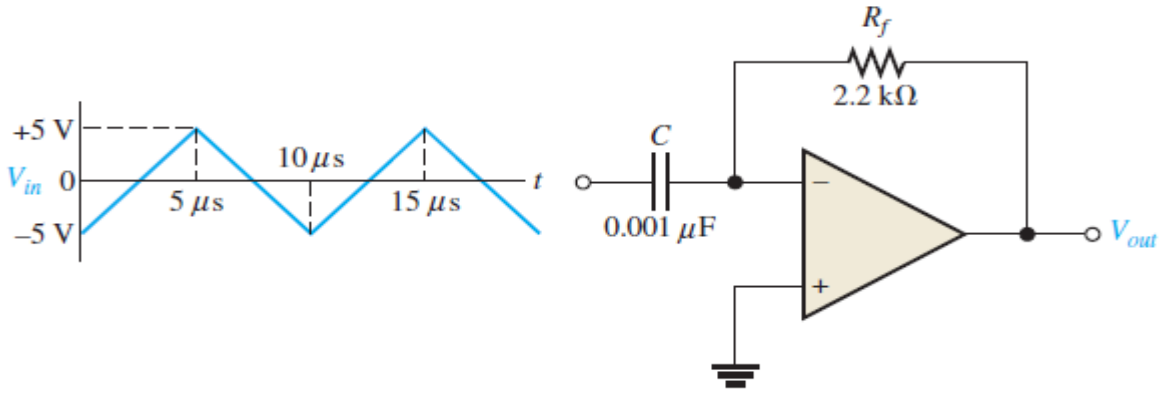
10. Determine the rate of change of the output voltage in response to the step input to the integrator



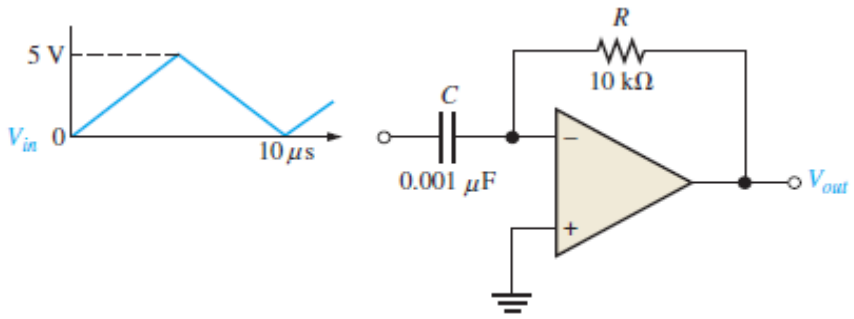
11. Determine the rate of change of the output voltage in response to the input square wave, as shown for the ideal integrator in Figure. The output voltage is initially zero. The pulse width is 200μs and describes the output and draw the waveform.



12. Determine the output voltage of the ideal op-amp differentiator in Figure for the triangular-wave input shown.

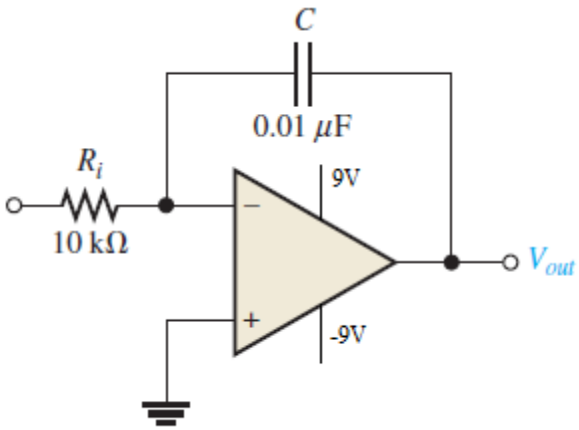


13. A triangular waveform is applied to the input of the circuit in Figure. Determine what the output should be and sketch its waveform in relation to the input.

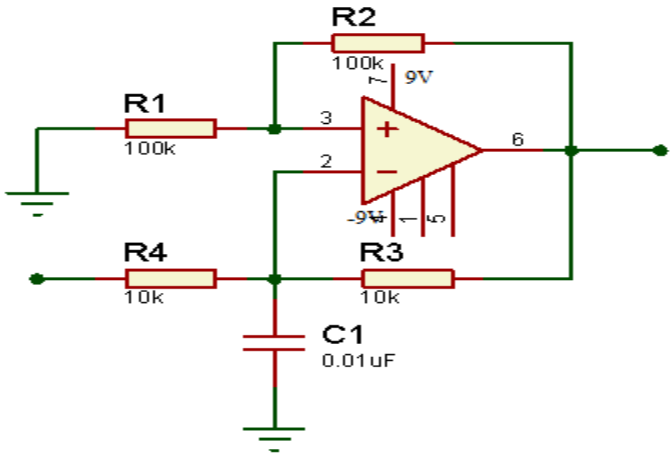


14. Determine saturation time for the following circuit assumes input square wave voltage = 3V

a)



b)



15. Problem 14 Sketch the output if input frequency= 2.5KHz.

16. Sketch the output of the following circuit if input pulses with 5V, frequency 2KHz and duty cycle =2%