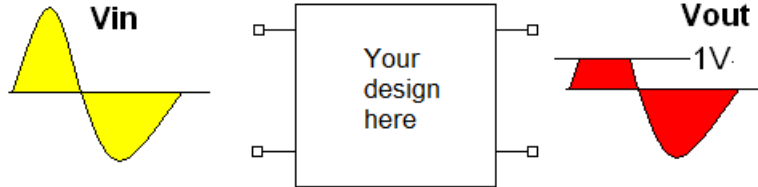# Electronics

Clippers

Problem 1.- Design a circuit that clips the positive voltage of a signal that is greater than 1V. Here is an example of how the circuit should behave:

Solution: A circuit that clips the positive voltage of a signal is called a "positive clipper" and can be made with a diode in series with a resistor. When the voltage is positive the output is clipped. To make the threshold 1V we need to add a 0.3V source (otherwise it will clip V>0.7volts). Example:
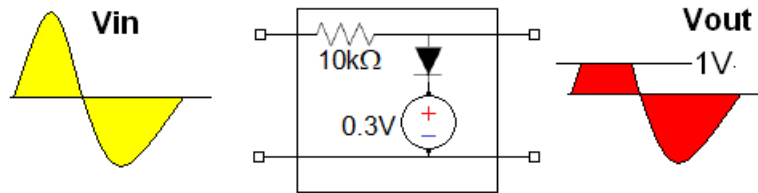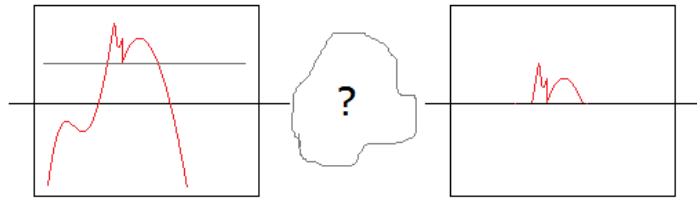

Problem 2.- It is required to build a circuit that clips positive voltage. Which of the following circuits would do that?
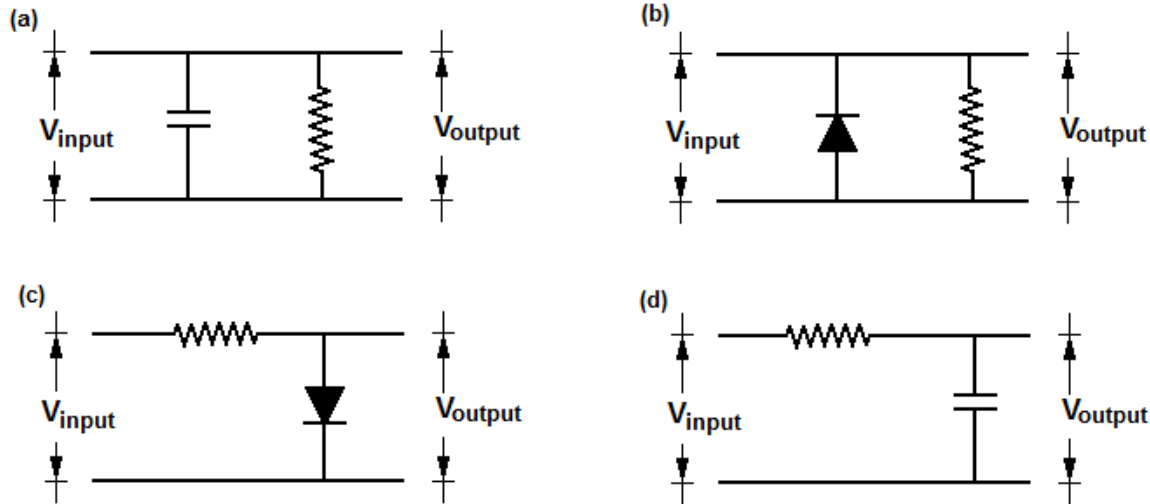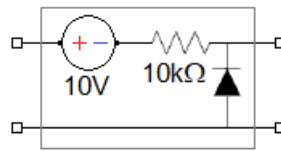

Solution: Circuit (c) clips positive voltage.

Problem 3.- Design a circuit that takes a signal from -20V to +20V and gives an output of only the values greater that 10V, as indicated below:


Solution: To accomplish this we could use a diode based circuit as shown below:


The diode clips the negative voltages assuring the output is positive (neglecting the small drop in the diode). The 10V source shifts the voltage 10V down, which means that only signals greater that 10V will be able to go through.

Problem 4.- Design a circuit with two stages. In the first stage the signal should be clipped so only values greater than 10V will get through and in the second stage the peak value of this signal is kept.
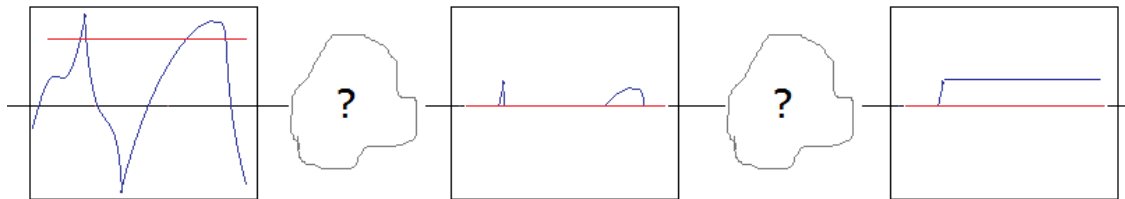

Problem 5.- Design a circuit based on diodes such that with an input signal Vi as shown in the figure, produces the output Vo. You can approximate diodes as ideal devices for this application.
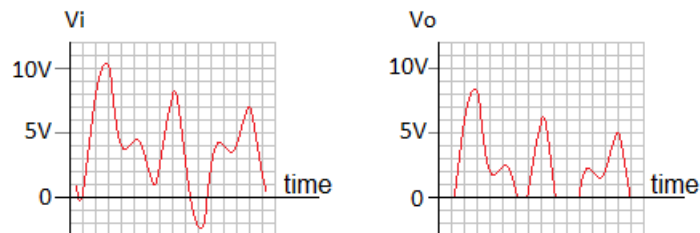
Problem 6.- Design a circuit that takes an input signal and outputs the part that is below -5V and shifts it as shown below. Consider silicon diodes and compensate for their 0.7V drop when conducting.
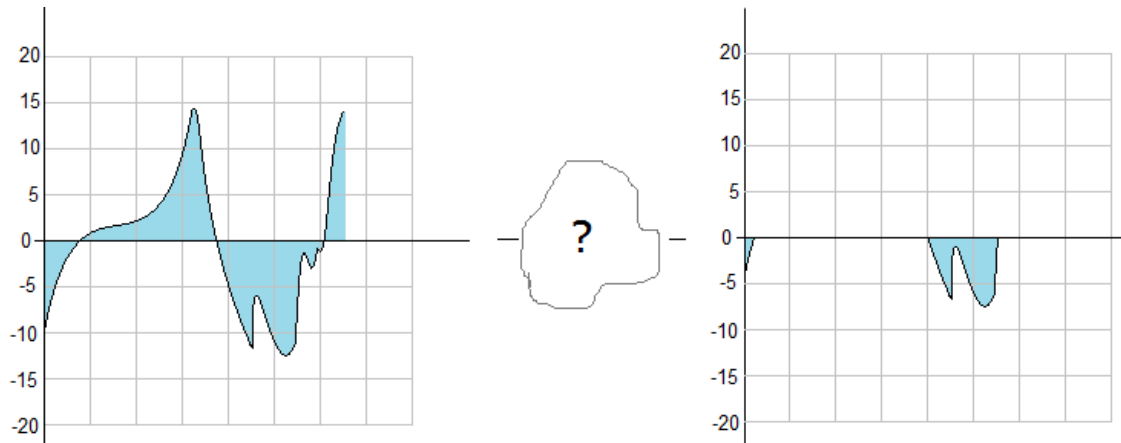
Solution: In a first approximation we can use the circuit shown below:
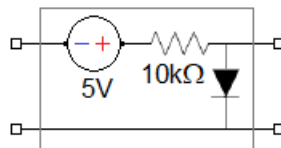
The diode clips the positive voltage assuring a negative output (neglecting the 07V drop for now). The 5V source shifts the signal 5V up assuring that only signals below -5V will go through.

To compensate the drop of 0.7V we could add a source in series that has the effect of moving its transfer curve to 0V: