Simulation Exercise: RC circuits

1. Write ngspice netlist for the RC circuit shown in Fig.1. Note: R=1KΩ and C=1μF

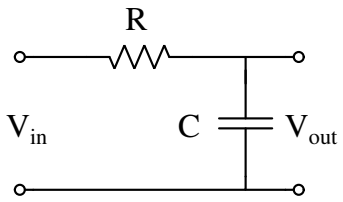

Figure 1: RC circuit 1 for simulation

2. Apply a square wave input of $10V_{PP}$ and $100Hz$ that varies from -5V to +5V.
3. Observe the input and output waveforms for 100Hz, 1Hz, 10kHz, and 100kHz.
4. Explain your observations.
5. Now add a DC offset of +5V so that V_{in} varies from 0 to 10V.
6. Observe the input and output waveforms for 100Hz, 1Hz, 10kHz, and 100kHz.
7. Change the duty cycle of the input voltage to 10 % and repeat step 10.
8. Modify the circuit as shown in Fig.2. and repeat the steps 1 to 7 for this circuit.
9. Explain your observations.

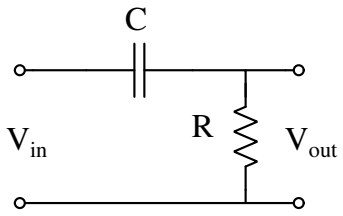

Figure 2: RC circuit 2 for simulation