1. For this homework you will simulate a switched capacitor 3 bit digital-to-analog converter as shown in Fig. 1. The input to the circuit are three bits $b_1$, $b_2$, $b_3$ with $b_3$ being the MSB. You need to first design CMOS logic circuits that can generate the logic functions shown in Fig. 1. Fig. 2 shows an example of an AND logic circuit that you could use. Similarly design the OR logic circuit.

2. Fig. 3 shows the clock signals that you need to (use vpulse in the NCSU analog library and appropriately set the rise-time, fall-time, start-time, time-period) keeping in mind that the important aspect is the non-overlapping time-period between the clocks. Set the $V_{dd} = 3V$, and $C = 100fF$. Run the transient analysis for a total duration of 1ms and plot the signals $b_1$, $b_2$, $b_3$, $\phi_1$, $\phi_2$, $V_x$ and $V_{out}$ [15 points].

3. Explain the output $V_{out}$ and $V_x$ using discrete-time equations. [5 points].

![Fig. 1](image1)

![Fig. 2](image2)