# Tutorial: 3

Q.1 : Design a synchronous sequential circuit using minimum number of DFFs and a 4:1 Mux to check the highest number of ones and zeros in the last 3 input samples. The design should give 1 at the output if the last 3 samples at the input has more number of 1's similarly than the number of zeros. Only one clock is available and the input is sampled at clock rate only.
Eg:
IN : 001110110000
OUT: 0111111000

Q.2 : We have a circular wheel with half painted black and the other half painted white shown in the fig below. There are 2 censors mounted 45 degree apart at the surface of this wheel( not touching the wheel) which give a "1" for black and "0" for white passing under them. Design a circuit, using DFF to detect which way the wheel is moving CW or ACW. Can not assume any fixed position for start.