

12.29 When started in state 0, an n -stage Johnson (twisted-ring) counter cycles through $2n$ states. A simple modification of the counter will cause it to cycle through $2n - 1$ states. (Assume the counter is implemented with D flip-flops.)

(a) Determine the equation for the shift register input so that the all 1's state is eliminated from the cycle with $2n$ states to obtain a cycle of length $2n - 1$.

(b) Repeat part (a) for the case when the all 0's state is eliminated.