1. Explain in words and write the HDL statements for the operations specified by the following register transfer notations:

   (a) \( R1 \leftarrow R1 - 1, R2 \leftarrow R1 \)
   (b) \( R3 \leftarrow \text{shr } R3 \)
   (c) If \( S = 0 \) then \( R0 \leftarrow \text{shr } R0 \) else \( R0 \leftarrow \text{shl } R0 \)

2. Construct a block diagram and an ASMD chart, and write a Verilog program, which counts the amount of money deposited in a coin sorter. The coin sorter will accept pennies, nickel, dimes and quarters. Only one coin will go through the sorter at a time, and that coin will be detected for exactly one clock cycle. There should be enough bits to hold ten dollars worth of coins.

   The datapath should consist of a register to hold the total amount, a combinational circuit which can add 1, 5, 10 or 25 to the register, and a display showing how much money is in the register.

   The controller should have a reset input to reset the count to zero.

3. The figure below shows a state diagram for a sequential circuit. Find the corresponding ASM chart. The inputs to the circuit are \( x_1x_0 \), and the outputs are \( z_1z_0 \).