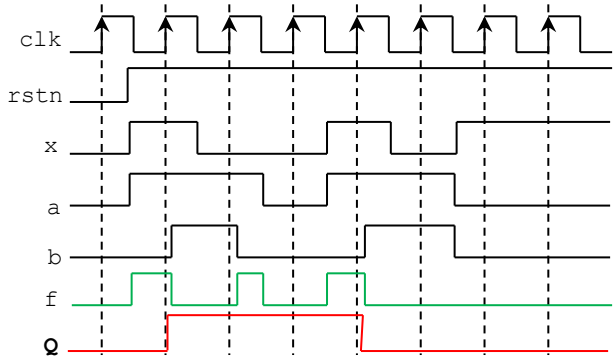
Solutions - Quiz 3

(November 5th @ 5:30 pm)

PROBLEM 1 (30 PTS)

- Complete the timing diagram of the circuit whose VHDL description is shown below:

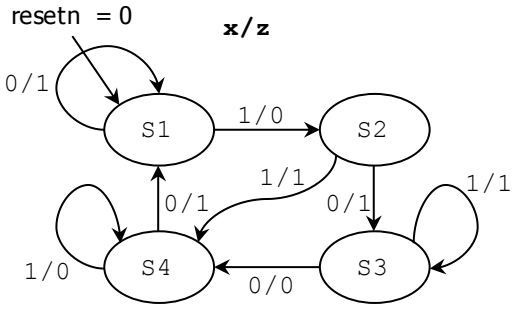
```
library ieee;
use ieee.std_logic_1164.all;

entity circ is
   port ( rstn, a, b, x, clk: in std_logic;
          q: out std_logic);
end circ;
```

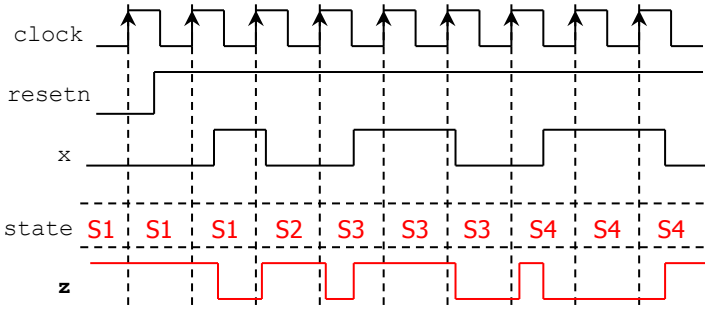



```
architecture xst of circ is
   signal qt, f: std_logic;

begin

   f <= a xor b;

   process (rstn, clk, f, x)
   begin
     if rstn = '0' then
         qt <= '0';
     elsif (clk'event and clk = '1') then
         if x = '1' then
             qt <= qt xor f;
         end if;
      end if;
   end process;
   q <= qt;

end xst;
```

PROBLEM 2 (30 PTS)

- Complete the timing diagram of the following state machine:





PROBLEM 3 (40 PTS)

- Complete the timing diagram of the following circuit. $Q = Q_3Q_2Q_1Q_0$
- Get the excitation equation for Q_3. (5 pts)

$Q_3(t+1) \leftarrow x \oplus Q_0(t)$