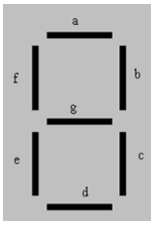
Name (Pin Yin): __Solution_____

CQUPT EE310 2020 Fall Quiz 3a

(15min, 20pts)

1. (4pts) For a 7-seg LED display, all outputs are active HIGH.



   a. Write the input binary code to display the hexadecimal number 'E'.
   1110

   b. What is the logic level for each output in order of abcdefg?
   1001111

2. (6pts) Read the following System Verilog program and answer the questions.

   a. How many input and output ports in the module named dec1?
   1 input port and 1 output port

   b. How many input and output pins in this circuit?
   2 input pins, 4 output pins

   c. Describe the function of the logic circuit. If possible, write down the official name of this circuit.
   This circuit functions as an encoder whose output is the binary equivalent of a power of 2 specified by the input, I.

```
module dec1 (input logic [1:0] I,
             output logic [3:0] O);
    always @(I)
    begin
       case(I)
         2'b00:  O = 4'b0001;
         2'b01:  O = 4'b0010;
         2'b10:  O = 4'b0100;
         2'b11:  O = 4'b1000;
         default: O = 4'bxxxx;
       end case;
     end
endmodule
```

3. (6pts) Rewrite the always block in question 2 using if –else if – else statements.

```
always @(I)
begin
        if(I == 2'b00) O = 4'b0001;
        else if(I == 2'b01) O = 4'b0010;
        else if(I == 2'b10) O = 4'b0100;
        else if(I == 2'b11) O = 4'b1000;
        else O = 4'bxxxx;
end
```

4. (4pts) A signal is defined as logic type, please explain what the following values mean.

'1': Logic level high or true or 1

'0': Logic level low or false or 0

'z': High Impedence (no connection)

'x': Logic level unknown

Name (Pin Yin): ___Solution_____

CQUPT EE310 2020 Fall Quiz 3b

(15min, 20pts)

1. (4pts) For a 7-seg LED display, all outputs are active LOW.
   a. Write the input binary code to display the hexadecimal number 'C'.
   1100

   b. What is the logic level for each output in order of abcdefg?
   1001110

2. (6pts) Read the following System Verilog program and answer the questions.
   a. How many input and output ports in the module named mux4?
   Two input ports, One output port

   b. How many input and output pins in this circuit?
   Six input pins, One output pin

   c. Describe the function of the logic circuit. If possible, write down the official name of this circuit.

   This is a 2 by 4 multiplexer that by way of the sel input, select one of four input lines to send to the output.

```
module mux4 (input logic [3:0] d_in,
             input logic [1:0] sel,
             output logic O);
);
    always @(sel, d_in)
    begin
       case(sel)
        2'b00: O = d_in[0];
        2'b01: O = d_in[1];
        2'b10: O = d_in[2];
        2'b11: O = d_in[3];
      end case;
     end
endmodule
```

3. (6pts) Rewrite the always block in question 2 using if –else if- else statements.

```
always @(sel, d_in)
begin
     if(sel == 2'b00) O = d_in[0];
     else if(sel == 2'b01) O = d_in[1];
     else if(sel == 2'b10) O = d_in[2];
     else if(sel == 2'b11) O = d_in[3];
end
```

4. (4pts)A signal is defined as logic type, please explain what the following values mean.

'X': _Unknown logic level_____ '1': _Logic level high or true or 1

'0': _Logic level low or false or 0 Z': _High Impedence (no connection)