Steven Tang

Homework 5

1) The four possible output values for a 1 bit binary variable is $\boxed{1, 0, x, z}$

2. The statements that are true are:

~~B) In verilog, one module can instantiate other modules, and can have multiple instances of another module~~

c) always @ can be used in describing combinational circuits

E) always @ can be used preceding a case statement

3.
```
module mux_4to1 ( input wire[3,0] I,
                  input wire[1,0] S,
                  input wire E,
                  output wire y );

    wire w1, w2;

    mux_2to1  m1 (w1, I[0], I[1], S[0]),
              m2 (w2, I[2], I[3], S[0]),
              m3 (F, w1, w2, S[1]);

endmodule,
```

```
4. module mux4_1_bh (I, select, y);
      input I;
      input select;
      output y;
      reg y;
     always @ (sel or I)
      case (sel)
       2'b00: y = I[0];
        2'b01: y = I[1];
        2'b10: y = I[2];
        end case
   endmodule
   module test_mux;
   reg [3:0] D;
    reg [1:0] s;
   wire Y;

   mux4_1_bh test ( I, select, y);

   initial begin
          d = 4'b0101;
           s = 2'b00;
           repeat (3)
             S = 2'b01;
       end
       initial
        $monitor (" %b %b %b", D, S, Y);
```

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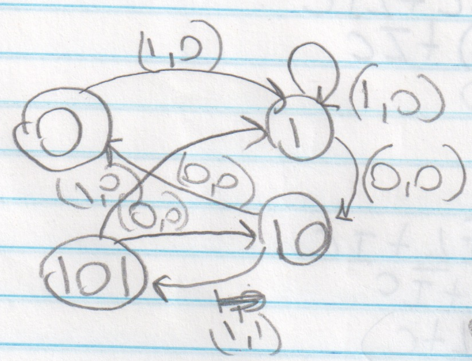
5.

Present A	B	C	Next A	B	C	JA	kA	Jb	Kb	Jc	kc
0	0	0	X	X	X	X	X	X	X	X	X
0	0	1	X	X	X	X	X	X	X	X	X
0	1	0	0	1	1	0	X	X	0	1	X
0	1	1	1	0	0	1	X	X	1	X	1
1	0	0	1	0	1	X	0	0	X	1	X
1	0	1	0	1	0	X	1	1	X	X	1
1	1	0	X	X	X	X	X	X	X	X	X
1	1	1	X	X	X	X	X	X	X	X	X

4.



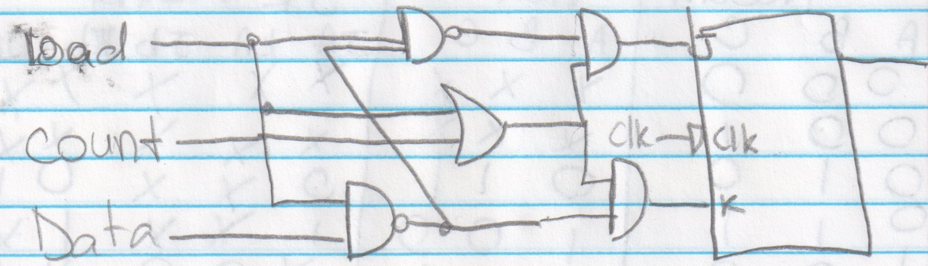
$D_A = (A \oplus B)$

$D_B = B \oplus C$

$D_C = \overline{C}$

Present A	B	C	Next A	B	C	D_A	D_B	D_C
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	0
0	1	0	0	1	1	0	1	1
0	1	1	1	0	0	1	0	0
1	0	0	1	0	1	1	0	1
1	0	1	1	1	0	1	1	0
1	1	0	1	1	1	1	1	1
1	1	1	0	0	0	0	0	0

7.



A) $J = LI_0 + \bar{L}C$

$K = L\bar{I}_0 + \bar{L}C$

B) $J = [\overline{L(\overline{LI})}](L+C)$

$= (\bar{L} + LI)L + C$

$= 0 + LI + \bar{L}C + LIC$

$= LI(1+C) + \bar{L}C$

$\boxed{= LI + \bar{L}C}$

$K = (\overline{LI})(L+C)$

$= \bar{I}L + \bar{L}C + \bar{I}L + IC$

$= \bar{L}C + \bar{I}L + \bar{I}C$

$= \bar{L}C + \bar{I}(L+C)$

$\boxed{K = C + L\bar{I}}$

It does verify