

ELEX 2117 : Digital Techniques 2
2024 Winter Term

Quiz 2

11:30 AM – 12:20 (or 1:20) PM

Tuesday, January 30, 2024

SW01-1021

This exam has two (2) questions on two (2) pages. The marks for each question are as indicated. There are a total of eleven (11) marks. Answer all questions. Write your answers and all rough work in this paper and nowhere else. Show your work. Underline or draw a box around your final answer. Numerical answers must include units. Books and notes are allowed. No electronic devices other than calculators are allowed. **Show your work.**

This exam paper is for:

Paper, Test 1 A00123456

Each exam is equally difficult.

Answer your own exam.

Do not start until you are told to do so.

Name: _____

BCIT ID: _____

Signature: _____

Question 1

4 marks

Fill the table below with the value of each expression as a Verilog numeric literal including the correct width and the correct value in hexadecimal base. Assume the following declarations:

```
logic [7:0] y ;
logic [3:0] x ;
```

and that **y** has the value **8'h63** and that **x** has the value **4'b1001**. The first row has been filled in as an example. You need not show your work or draw another box around the answer

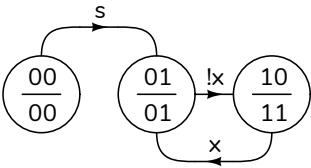
expression	value
y[3:0]	4'h3
x + y	
x[2:1] ? y : !y	
~ y[3:2] & 15	
y >> 4 > ~ x	

rough work below

Question 2

7 marks

Write one **always_ff** statement and one **assign** statement in the incomplete System Verilog module below so that the module implements the following state transition diagram:



The diagram follows the course conventions: each state bubble shows the value of **st(ate)** above the value of **o** in that state; both in binary. Transitions are labelled with expressions involving the inputs. You may assume **st** is initialized to **2'b00**. Follow the course coding guidelines but omit comments.

```
module q2
( input logic s, x, clock,
  output logic [1:0] o ) ;

logic [1:0] st ;    // write your code below
```

endmodule

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Question 1

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```
logic [7:0] y ;
logic [3:0] x ;
```

and that **y** has the value **8'h9c** and that **x** has the value **4'b0110**. The first row has been filled in as an example. You need not show your work or draw another box around the answer

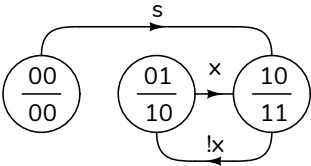
expression	value
y[3:0]	4'hc
x + y	
x[2:1] ? y : !y	
~ y[3:2] & 15	
y >> 4 > ~ x	

rough work below

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