ELEX 2117 : Digital Techniques 2
2023 Winter Term

Solutions to Quiz 1

There were two versions of each question. The values and the answers for both versions are given below.

Question 1

Write a Verilog module named `q1` that has two logic inputs named v0 and v1 and two logic outputs named vor and vand (or vxor and vall). Leave the module empty – it should have no statements other than module and endmodule.

Answers

```
module q1
  ( input logic v0, v1,
    output logic vor, vand ) ;
endmodule
```

```
module q1
  ( input logic v0, v1,
    output logic vxor, vall ) ;
endmodule
```

Question 2

Write a Verilog literal that has a width of 8 (or 4) bits, uses a hexadecimal (or decimal) base and has a value of 18 (or 12) (decimal).

Answers

`8'h12` (or `4'd12`).

Question 3

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] a ;
logic [3:0] b ;
```

and that `a` has the value `8'ha5` (or `8'h5a`) and that `b` has the value `4'b0110`. The first row has been filled in as an example.

expression	value
`b[3:0]`	`4'h6`
`!a[0]`	
`{ a[2:1], 2'b11 }`	
`a + b == 0`	
`'1 ^ a`	
`a && !b`	
`a[0] ? 1 : 2`	
`b >> 2`	

Answers

For:

```
logic [7:0] a = 8'h5a ;  // 0101_1010
logic [3:0] b = 4'b0110 ;
```

and

```
logic [7:0] a = 8'ha5 ;  // 1010_0101
logic [3:0] b = 4'b0110 ;
```

the values are:

expression	value	value
`b[3:0]`	`4'h6`	`4'h6`
`!a[0]`	`1'h1`	`1'h0`
`{a[2:1],2'b11}`	`4'h7`	`4'hb`
`|a + b |== 0`	`1'h0`	`1'h0`
`'1 ^ a`	`8'ha5`	`8'h5a`
`a && !b`	`1'h0`	`1'h0`
`a[0] ? 1 : 2`	`32'h2`	`32'h1`
`b>>2`	`4'h1`	`4'h1`

Question 4

Draw a block diagram (a schematic) that corresponds to the following Verilog module:

```
module x ( input  logic [7:0] a,
           output logic [7:0] y ) ;
   assign y = a > 2 ? a : a+1'b1 ;
endmodule
```

or

```
module x ( input logic clk,
           output logic [7:0] y ) ;
   always_ff @(posedge clk)
     y <= y + 1'b1 ;
endmodule
```

Follow the guidelines in the Diagrams section of the Report and Video Guidelines document.

Answers