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specific questions on Quiz 1 now that deadline has passed

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Karen West · 4 hours ago

Is there someone willing to chat with me about Questions 2 and 5 that I got incorrect on Quiz 1 now that the deadline has passed? I also had a few questions on a few I got correct that week.

Question 2 was in regard the digital system to make a multiplication table. I got the x bits as input, y bits as output, but I got the z input combinations as don't cares incorrect.

Question 5 was the design of an encoder with 2 different implementations of signals a and b as functions of inputs x,y,z. It asked including those 2 implementations, how many implementations there would be. It gave a hint that when the values of a and b on each don't care conditions are given, the solution becomes unique.

Although I got all the rest of the questions correct, I wanted to also chat about the topics in questions: 3,4,6,7 and 10, since it took me a few attempts to get them all correct, and I had a few questions there too.

Week 2 I got everything correct, and Week 3, just one wrong that I still don't understand (Montgomery Reduction!), but Week 1 I did have these lingering questions.

Thanks to anyone who can help! ;-)

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Kevin J McCabe · an hour ago

Question 2 :

A decimal digit (0-9) requires 4 bits of binary data. This is commonly called BCD (Binary Coded Decimal). Since you are multiplying 2 decimal digits, the input would require 2 x 4 bits = 8 bits of data.

The output needs to be able to represent all numbers from 0 to 81, the max value for 2 digit multiplication. To represent 81 in binary, you need 7 digits. With 6 digits you can only represent 64 distinct values.

Those 8 input bits of binary data could contain any one of 2^8 = 256 different values. Some of those values would represent 2 valid BCD digits. However, some combinations of 0's and 1's do not represent valid BCD digits. Of the 256 different combinations of 0's and 1's, only 100 are valid BCD combinations. We know this since the first digit can be any of 10 possibilities (0-9) and the second digit can be any of 10 possibilities (0-9). There are 256 total binary possibilities with 8 bits of input and 100 valid inputs, leaving 156 invalid inputs. These 156 invalid inputs are the don't care combinations.

Question 5:

X	Y	Z	A	B
0	0	0	x	x
0	0	1	0	1
0	1	0	1	0
0	1	1	x	x
1	0	0	1	1
1	0	1	x	x
1	1	0	x	x
1	1	1	x	x

There are multiple ways to look at this problem and get the right answer. Here are two ways...

Method 1:
We have 3 inputs (x,y,z), so there are 8 possibilities. Of those 8, 3 are defined, leaving 5 as don't care conditions. Each of those 5 don't care conditions can have any of 4 possible outputs (00,01,10,11). Thus there are 4^5 = 1024 combinations of those independent outputs.

Method 2:
In the truth table there are 10 x's where we don't care what the output value is. Each of those x's could be either 0 or 1. Thus 2^10 = 1024 combinations.

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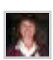

Karen West · in 4 minutes

That was an excellent explanation, Kevin, on Questions 2 and 5 from Quiz 1. Thank you for your help! ;-)

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