

Quiz (Lecture 4)

Your name:

Q1: (2points) Complete the following sentences:

The Hamming distance between the two binary strings 10101100 and 11101110 is 2

Using the “even parity code”, the data word 111010 is encoded as 1110100

Q2: (3 points) While executing the loop

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for(i=0; i<n ; i=i+2)
```

```
    c = c + a[i] + a[i+1] + b[i] ;
```

on a system with 8-words cache blocks, the cache miss rate for the elements of a[] is 12.5%
and the cache miss rate for the elements of b[] is 25%

Q3: (3 points) The code word 1100100 has an error in Bit 6 assuming (4,7) Hamming code where a 4-bits data word is encoded as a 7-bits code word. Use the template shown below for the (4,7) Hamming code:

	Bit 1 (p1)	Bit 2 (p2)	Bit 3 (d1)	Bit 4 (p3)	Bit 5 (d2)	Bit 6 (d3)	Bit 7 (d4)	
	1	1	0	0	1	0	0	
p1	1		0		1		0	s1 = 0
p2		1	0			0	0	s2 = 1
p3				0	1	0	0	s3 = 1

Note: If “s3 s2 s1” is not 000, then there is an error in bit s3 s2 s1

Q4: Compute the time to fetch a 4-words cache block from a memory where the 4 words of the block are stored in four interleaved banks connected to the cache controller by a bus assuming that:

- To send a 32-bit address from the cache controller to the memory, the bus takes two cycles (16 bits are sent each cycle)
- To return a 32-bit data word back from the memory to the cache controller, the bus takes two cycles
- It takes 10 cycles to read a word from a memory back (from the time it receives the 32-bit address to the time it returns the 32-bits data word).

$$(2+10+2) + 2 * 3 = 20 \text{ cycles}$$