

# Computer Systems Architecture

<http://cs.nott.ac.uk/~txa/g51csa/>

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Thursday quiz



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# Thursday quiz

Most of the following questions are multiple choice. There is at least one correct choice but there may be several. For each of the questions list all the roman numerals corresponding to correct answers but none of the incorrect ones.

Questions are marked as follows:

<b>no errors</b>	5 points
<b>1 error</b>	3 points
<b>2 errors</b>	1 point
<b>≥3 errors</b>	0 points



# Thursday quiz

1. Which of the following equations about 4-bit numbers is correct (ignoring carry)

a  $0101 + 1010 = 1111$

b  $1110 + 0111 = 1001$

c  $1111 + 0001 = 0000$

d  $1100 - 0011 = 1001$

e  $0001 - 0010 = 1111$



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2. Consider a half-adder with inputs  $a, b$ . How can we calculate the sum  $s$  and the carry  $c$  in C?

- a  $s = a \wedge b$
- b  $s = a | b$
- c  $s = (a | b) \& ! (a \& b)$
- d  $c = a \& b$
- e  $c = a | b$



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3. Which of the following statements about 8-bit two's complement are correct?
- a The largest positive number is  $127 = 2^7 - 1$ .
  - b The least negative number is  $-127 = -(2^7 - 1)$ .
  - c Adding  $11111111_2$  and  $00000001_2$  produces an overflow.
  - d Adding  $01111111_2$  and  $00000001_2$  produces an overflow.
  - e The two's complement of  $00000000$  is  $00000000$ .



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4. There are signed and unsigned variants of arithmetic instructions for MIPS. Which of the following statements are correct?
- a addu uses different addition circuits than add.
  - b slt and sltu may return different results on the same input.
  - c slt and sltu always return different results on the same input.
  - d lb performs sign extension when loading a byte.
  - e sb performs sign extension when storing a byte.



# Thursday quiz

5. When adding two numbers in two's complements an overflow may arise. Which of the following is correct?
- a If the signs of the inputs are different there is never an overflow.
  - b If the signs of the inputs are the same there is never an overflow.
  - c If the signs of the inputs are the same, but the sign of the output is different then there is an overflow.
  - d If the signs of the inputs and the outputs are the same there is no overflow.
  - e If the signs of the inputs and the outputs are the same there is an overflow.

