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HW #1 Answer Sheet

Gebze Technical University
Department of Computer Engineering
CSE 101 – Introduction to Computer Engineering
HW #1

Due date: 20/10/2018 – 09:00

1. *Convert the following hexadecimal numbers to binary and binary numbers to hexadecimal. Separate each 4 bits from each other with a space character when converting to binary.*
   a. *8A9*
   b. *EF3*
   c. *0001 1110 0001*
   d. *1111 1110 1101 1011*

a) 1000 1010 1001
b) 1110 1111 0011
c) 1E1
d) FEDB

2. *Below is a message first coded in ASCII and then converted to hexadecimal. Decode the message and show your steps.*
   436F6D7075746572

I decoded the message by separating two characters at a time; thus, giving me “43 6F 6D 70 75 74 65 72”. Then I looked at the ASCII table which includes the hexadecimal listings of the characters. List conversion gave me the answer “C o m p u t e r”. So, hexadecimal showing of 436F6D7075746572 means Computer in ASCII.

3. *Perform the mathematical operations below by converting each decimal into a 5-bit two’s complement format. Check your results by doing the same operations in decimal format. Specify which of the operations causes an overflow.*
   a. *5 – 1*
   b. *5 – 11*

a) 5 in two’s complement in 5-bits is 00101. -1 in two’s complement in 5-bits is 11111. If we add them together to get the result of 4, the sing bit should be 0 which is positive. When we do the math, we have a 6-bit number: 100100. But this does not cause an overflow since the result should also be 5 bits, which becomes 00100; which is 4. *Overflow doesn’t exist in this example.*
b) 5 in two’s complement in 5-bits is 00101. -11 in two’s complement in 5-bits is 10101. The result should be “-6” in 5-bits. If we add them together, the resolution is 11010 which is -6, and is in 5-bits. *Overflow also does not occur in this example.*

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4. *Perform the following operations.*
   a. *01001011 AND 10101011*
   b. *01001011 OR 10101011*
   c. *01001011 XOR 10101011*

a) 00001011
b) 11101011
c) 11100000

5. *The followings are the instructions according to the machine language given in the appendix of your text book (Appendix C). Find the corresponding assembly commands.*
   a. *7123*
   b. *2BCD*

a) 7123 would OR the contents of register 2 and register 3 to register 1.
b) would LOAD the register B with the bit pattern CD.

6. *Write an assembly program which obtains an 8-bit value by combining the first and the last 4 bits of the memory cells addressed with A0 and A1 respectively and writes this 8-bit value into the memory address A2.*

Let's assume there is a chosen value of 78 and 42 in decimals. Then;

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load R0, 4Eh          ; load register R0 with the number 4E (which is 78 in decimal)
load R1, 2Ah          ; load register R1 with the number 2A (which is 42 in decimal)

store R0, [160]       ; 160 is A0. Store the data from the register R0 to A0.
store R1, [161]       ; 161 is A1. Store the data from the register R1 to A1.

load R2, 240d         ; 240 in decimal is 11110000 in binary.
load R3,15d           ; 15 in decimal is 00001111 in binary

and R4, R0, R2        ; if we and R0 with R2; we would only get the first 4 bits of the R0
                        since first nibble of R2 is 1111
and R5, R1, R3        ; Same principle here. If we and R1 with R3; we would only get the
                        last 4 bits of R1 since second nibble of R3 is 1111

or R6, R4, R5         ; We would then or the results we found by and'ing the two registers;
                        which is R4 and R5, to the R6.

store R6, [162]       ; Then write the result to cell 162 which is A2

halt
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