**Wenzhou-Kean University Group Assignment-1 Fall 2021**

**CPS 2390 W04 Computer Organization & Architecture   
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# Problem 1 (0.5 Mark)

How many distinct values can be represented by 16 bits?

216 = 65536

# Problem 2 (0.5 Mark)

Complete the following table for conversion between hexadecimal and binary:

|  |  |
| --- | --- |
| **Binary** | **Hexadecimal** |
| 1100 0101 | C 5 |
| 0100 1101 | 4 D |
| 0011 0110 | 3 6 |

# Problem 3 (0.5 Mark)

Using ASCII 8-bit, null-terminated string patterns, represent each of the characters in the string "Fall 2021" using the hexadecimal value. (Only represent the characters between the quotation marks.)

F: 46

a: 61

l: 6C

l: 6C

<SPACE>: 20

2: 32

0: 30

2: 32

1: 31

# Problem 4 (0.5 Mark)

Convert the following 8-bit signed 2's complement binary numbers to decimal. a. 1011 0101

b. 1110 1111

c. 0011 1001

1. -75
2. -17
3. 57

# Problem 5 (0.5 Mark)

What conditions indicate overflow has occurred when two 2’s complement numbers are added.

Both operands are positive or negative, but the result of them is opposite.

# Problem 6 (0.5 Mark)

Find the 2’s complement of the following binary numbers a. 0011 0101

b. 0110 1100

c. 1011 1010

1. 1100 1011
2. 1001 0100
3. 0100 0110

# Problem 7 (0.5 Mark)

Using 6 bits to represent each number, write the binary representations of 26 and -26 in unsigned, sign-magnitude, 1’s complement, and 2's complement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | unsigned | sign-magnitide | 1's complement | 2's complement |
| 26 | 01 1010 | 01 1010 | 10 0110 | 10 0110 |
| -26 | NA | 11 1010 | 01 1001 | 01 1010 |

# Problem 8 (0.5 Mark)

Compute the following:

1. NOT(0110) AND NOT(1011)

2. NOT(1101 OR (0101 AND 1100))

1. 0000
2. 0010

# Problem 9 (0.5 Mark)

Write the decimal equivalents for these IEEE floating point numbers. a. 0 01111111 11000000000000000000000

b. 1 01111110 10000000000000000000000

* 0 01111111 11000000000000000000000 = 1.75
* 1 01111110 10000000000000000000000 = -0.75

# Problem 10 (0.5 Mark)

A programmer attempts to write a program to add two numbers. When the numbers 3 and 7 are added, the result given is the letter ‘j’. Explain why this is the result instead of 10.

Hint: consider how the computer might interpret the values as something other than numbers.

This programmer incorrectly used character arithmetic instead of number arithmetic, in other words, they add up the code represented the character ‘3’ and ‘7’ which results106 or ‘j’ in ASCII. For instance, in C programming language, the result of ‘3’ + ‘7’ would be ‘j’ by default.

#include <stdio.h>

int main(){

char s = '3';

char t = '7';

char r = s + t;

printf("%d\n", r);

printf("%c\n", r);

return 0;

}

Console:  
106

j