



Beijing-Dublin International College



AUTUMN TRIMESTER FINAL EXAMINATION - (2020/2021)

School of Computer Science

COMP1001J Introduction to Programming 1

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Time Allowed: 120 minutes

Instructions for Candidates:

Answer all Questions.

BJUT Student ID:_____ UCD Student ID:_____

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge:_____ (Signature)

Instructions for Invigilators

Non-programmable calculators are permitted.

No rough-work paper is to be provided for candidates.

Question 1: Terminology and Basic Programming

- a. The function `scanf` allows the program to receive input from the user. Give the format specifiers you must use for each of the following types:

(i) text (string) `%s` (iii) float `%f` (v) double `%lf`
 (ii) int `%d` (iv) char `%c` (5%)

- b. How is the value 47 represented as an 8 bit two's complement number in binary? `00101111`
 How is the value -47 represented as an 8 bit two's complement number in binary? `11010001`
 Verify your final answers by summing the value of each individual bit in the number.

- c. List the data types that we use for whole numbers and real numbers, give an example of a variable definition of each. How do we represent text? How is this different from the numbers?
 int `a = 5` float `double` float `a = 0.5` double `b = 7.3` (5%)
 char `text[] = "Hello"` (5%)
 the size is different float is 4 bytes, double is 8 bytes

- d. Write the code in C to output all of the numbers between 25 and 49 (inclusive) twice on a single line (separated by spaces). E.g. 25 25 26 26 You must write this code using a `for` loop.

```
for(i=25; i<=49; i++)
{ printf("%d %d", i, i); }
```

(5%)

- e. What is an array? Give an example of how to create an array named `nums` that contains 3 integers with the values 11, 15 and 55.

represent list of data (5%)
`int nums = { 11, 15, 55 };`

- f. Consider the following code:

```
1 if ( (A && B) || !C ) {
2     printf("True");
3 } else {
4     printf("False");
5 }
```

(A && B) || !C represent 0
 C represent 1 !C represent 0

What is the result of the code if the A represent a value that is true, B represents a value that is false and C represents a value that is true. Explain your answer.

False A represent 1 B represent 0 A && B represent 0 (5%)

- g. Give an example of the code to open a file (named "myFile.txt") for reading. When opening a file for writing ("w") what happens to the file if it already exists? When opening a file for reading ("r") what happens if the file doesn't already exist?

"w": be replace with a blank file "r": return NULL (5%)

- h. What is a pointer? How can we get a value from a pointer? How can we get a pointer from a variable? Use some example code to illustrate your answers

use variable to remember address of value (5%)
 Question Total 40%

```
int a = 5;
int *p = &a; get pointer.
```

```
int *p
int b = *p (get value)
```

Question 2: Program Comprehension

- a. Trace the code below assuming that the number 12 and an empty character array are passed as parameters. E.g. `f(12, text);`. Your result should only describe the high level actions of each line, breaking down each line into steps is not required.

```

1 void f(int n, char b[]){
2     strcpy(b, "00000000");
3     int i = 7;
4     while (n > 0){
5         char a = n % 2;
6         b[i--] = a + '0'; // '0' is 48
7         n = n / 2;
8     }
9 }

```

The result should be in a table like this:

Line	Explanation	Code	Result	Type	n	b	a	i
2	Call Function	<code>strcpy(b, "00000000")</code>	None	None	12	"00000000"	?	?
3	definition value	<code>int i = 7</code>	None	None	12	"00000000"	?	7
4	while loop	<code>while (n > 0)</code>			12	"00000000"	?	7
5	definition a store the remainder of n/2	<code>char a = n % 2</code>			12	"00000000"	0	7
6		<code>b[i--] = a + '0'</code>			12	"(30%)		

(Question Total 30%)

Question 3: Programming Problems

- a. Write a program in C to ask the user to enter three integer values and outputs the largest value.

(10%)

- b. Write a function in C named `printUppercase` that takes an array of characters as a parameter (string). This function should print the contents of the string, but every lowercase letter ('a' - 'z') should be printed as an uppercase letter ('A' - 'Z'). All other characters should be printed as normal. Hint: The character 'A' is the number 65 and 'a' is the number 97.

(20%)

(Question Total 30%)

```
a #include <stdio.h>
int main()
{
    printf("please enter three integer values ");
    int a, b, c;
    scanf("%d %d %d", &a, &b, &c);
    int max = a;
    if (b > max)
        max = b;
    if (c > max)
        max = c;
    printf("%d", max);
}
```

```
b #include <stdio.h>
void printUppercase(char text[]) { int i=0;
while (text[i] != '\0');
if (text[i] >='a' && text[i] <='z') {
    text[i] -= (97-65);
    i++;
}
printf("%s", text);
}
```