



Beijing-Dublin International College



AUTUMN TRIMESTER FINAL EXAMINATION - (2021/2022)

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. For each of the following input/output functions, describe what the function does and give an example of how it is used

- `scanf`
- `gets`
- `printf`

(5%)

- b. How is the value 25 represented as an **8 bit two's complement** number in binary?
How is the value -25 represented as an **8 bit two's complement** number in binary?
Verify your final answers by summing the value of each individual bit in the number.

(5%)

- c. What is the result of the expression `!( ( A || B ) && C )` for each set of values below. Here T represents true (or 1) and F represents false (or 0).

Part	A	B	C	<code>!((A B) && C)</code>
1	T	T	T	
2	F	T	F	
3	T	F	F	
4	F	F	T	
5	T	T	F	

(5%)

- d. 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?

(5%)

- e. 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 while loop.

(5%)

- f. Draw a diagram to show the values contained in the array created with the following statement. `int numbers[10] = { 1, 2, 3, 4 };`

(5%)

- g. Why is `gets` considered unsafe? What function can we use instead and why is it safe? Given an example of using this function.

(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

(5%)

(Question Total 40%)

Question 2: Program Comprehension

- a. Trace line 4 of the code below. Show the correct order that the parts of the statement are executed in. The question must be answered in the designated table in your answer book.

```
1 int main(){
2     int a = 9;
3     int b = 16;
4     if (a < 5 || b > 10){
5         printf("Message\n");
6     }
7     printf("A different message\n");
8 }
```

(10%)

- b. Trace the code below, your result should only describe the high level actions of each line, breaking down each line into steps is not required. This question must be answered in the designated table in your answer book.

```
1 int main(){
2     int arr[3] = {5, 7, 8};
3     int a = 0;
4     int b = 0;
5     while (a < 3){
6         if (arr[a] % 2 == 1){
7             b = b + arr[a] * 2;
8         } else {
9             b = b + arr[a];
10        }
11        a = a + 1;
12    }
13    printf("%d\n", b);
14 }
```

(20%)

(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 middle value. You can assume that all values will be unique.

(15%)

- b. Write a function in C named `letterCount`. This function should take an array of characters as a parameter. This function should calculate the number of upper case ('A' - 'Z') and lower case ('a' - 'z') letters in the string and print this information to the screen.

Note: Any character that is not a letter should be ignored.

Example: `letterCount("This is A test!!!");`

Output: The string 'This is A test!!!' contains 3 upper case letters and 8 lowercase letters

(15%)

(Question Total 30%)