Princess Sumaya جامعة الأميرة سميّة للتكنولوجيا University for Technology

The King Hussein School for Computing Sciences
Department of Computer Science
Structured Programming - Spring 2023

First Exam

Full Name: **Student ID:**

Question	Points	Score
1	5	
2	4	
3	PART 1: 4	
	PART 2: 4	
	PART 3: 4	
	PART 4: 4	
Total	25	

Circle your section:

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Saturday 1/4/2023

Question 1 (5 points)

Fill the **Output** column in the table below with the output of the code provided in the **Code** column. If the code does not compile, write "**compilation error**" instead of the output.

Assume `x` and `a[]` are defined as follows: `int x = 5;` `int a[10] = {1, 2, 3, 4};`
Assume also that each row is independent (does not depend on the rows before).

	Code	Output
1.	`printf("%d", 3 + 1 / 2 * 2 - 2);`	
2.	`x == 1 ? printf("1") : printf("0");`	
3.	`printf("%d", a[5]);`	
4.	`printf("%0.3f", x + 0.5);`	
5.	`printf("%d", 'b' - 'a');`	
6.	`if (rand() % x == 5) printf("5");` `else printf("??");`	
7.	`while (x > 1) printf("%d", --x);`	

8.	`#define Y = 5;`
	`int main() { printf("%d", Y+1);`
	`return 0; }`	

9.	`if (x = 1) printf("equal 1");` `else printf("not equal 1");`	

10.	`int y = 0;`
	`void f(int y) {`
	`printf("%d ", y);`
	`}`
	
	`int main() {`
	`f(6);`
	`printf("%d ", y);`
	`return 0;`
	`}`	

Question 2 (4 points)

What is the output of the following piece of code in each of the cases given below? Assume that `N` was defined using `#define`.

```
// define and initialize an array
// a[] of size N

int i = 0;
while (i < N && a[i] % 2 != 0)
     i++;

int j = N-1;
while (j >= 0 && a[j] % 2 != 0)
     j--;

if (j <= i || a[i] != a[j])
     printf("-1");
else
     printf("%d", a[i]);
```

A. If `N = 1` and `a = {2}`

B. If `N = 2` and `a = {4, 4}`

C. If `N = 1000` and `a = {0, 1, 2, ..., 999}`

D. If `N = 1000` and `a = {997, 995, 993, ..., 5, 3, 1, 0, 1, 3, 5, ..., 999}`

Question 3 (16 points)

PART 1. Write a **`void`** function named **`checkFermat`** that receives four integers: `a`, `b`, `c`, and `n`.
The function prints:

- `"Fermat is wrong"` if $a^n + b^n = c^n$
- `"Fermat might be correct"` otherwise.

You are **not** allowed to use any function from `math.h`.

PART 2. Implement a **`void`** function named **`hangman`**, which receives a `word` as a character array and a letter `chr`. The function prints the word hiding the letters that are not equal to `chr` (using `'_'`).

Examples.

		After calling `hangman(word, chr)`
• `word = "international",`	`chr = "n"`	`word = "_n___n____n__"`
• `word = "woow",`	`chr = "o"`	`word = "_oo_"`
• `word = "hello",`	`chr = "z"`	`word = "_____"`

PART 3. Implement a function named **is_triplets**, which receives an array of integers and its size. The function returns `1` if the array is made of triplets of equal numbers (see the examples) and `0` otherwise.

Examples.

- `[5, 5, 5, 2, 2, 2, 1, 1, 1]` return `1`
- `[1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]` return `1`
- `[5, 5, 5, 2, 2, 2, 1, 1]` return `0`
- `[1, 2, 3, 1, 2, 3, 1, 2, 3]` return `0`

PART 4. Implement a function named **majority_odd**, which receives three integers and returns `1` if the majority of these integers are odd and `0` otherwise. (`3.5` points)

Examples: `1, 2, 3:` Return `1` because two of the numbers are odd.
`2, 4, 5:` Return `0` because only one of the numbers is odd.

Note. You are not allowed to define any variable in your implementation. If you do, you will receive at most `2/3.5` points.

PART 4.5 Implement function **`majority_odd`** using only one line, containing one statement. (`0.5` points)