



Princess Sumaya جامعة
University الأميرة سميرة
for Technology للتكنولوجيا

The King Hussein School for Computing Sciences
Department of Computer Science
Structured Programming - Fall 2021

Midterm Exam

Full Name:

Student ID:

| Question | Points | Score |
|--------------|------------|-------|
| 1 | 10 | |
| 2 | 10 | |
| 3 | 15 | |
| 4 | 15 | |
| 5 | 20 | |
| 6 | 20 | |
| Total | 100 | |

Circle your section:

- Dr. Mohammad Al Nabhan (section 1)
- Dr. Rawan Ghnemat (section 2)
- Dr. Rawan Ghnemat (section 3)
- Dr. Mohammad Abu Snober (section 4)
- Dr. Abdullah Aref (section 5)
- Dr. Sawsan Alshatnawi (section 6)
- Dr. Mohammad Al Nabhan (section 7)

Question 1 (10 points)

```
for (int i = 0; i < N; i++) {  
    for (int j = 0; j < i; j++)  
        a[i] = a[i] + 2;  
}
```

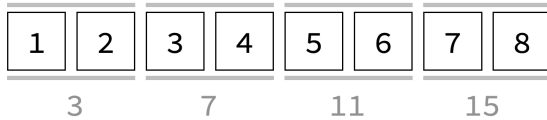
Assuming that `a[]` is initialized to zeros, what is the value of `a[N-1]` after executing the code on the left in each of the following cases?

- If $N = 1$
- If $N = 2$
- If $N = 101$

Question 2 (10 points)

Assume that `a[]` is an array of integers of size N , where N is a multiple of 2. Write a for-loop that prints the sum of pairs in the array as shown in the illustration and sample output below.

Example.



Output.

```
1 + 2 = 3  
3 + 4 = 7  
5 + 6 = 11  
7 + 8 = 15
```

Question 3 (15 points)

```
int num, size, temp1 = -1, temp2 = -1;
scanf("%d", &N);

for (int i = 0; i < N; i++) {
    scanf("%d", &num); // assuming num >= 0
    if (i == 0)
        temp1 = num;
    else if (num > temp1) {
        temp2 = temp1;
        temp1 = num;
    } else if (num > temp2)
        temp2 = num;
}

printf("%d", temp2);
```

What does the above code print for each of the following input sequences?

- 4 1 2 1 1
- 1 1
- 100 100 99 98 97 ... 5 4 3 2 1
- 1000 followed by the numbers from 1 to 1000 but in random order.

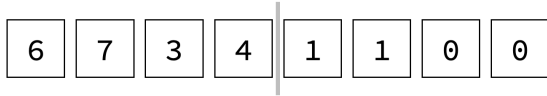
Question 4 (15 points)

The instructors of the structured programming lab decided to consider the grades of only the top 11 labs out of the 12 labs students did during the semester. Write a complete C program that reads the grades for the 12 labs and then prints the average grade for the highest 11 labs.

Question 5 (20 points)

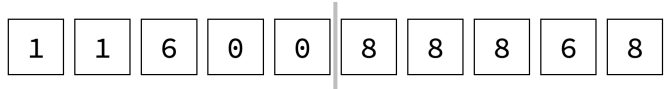
Assume that `a[]` is an array of integers of size `N`, where `N` is an *even* number. Write a piece of code that prints “yes” if any of the elements in the first half of the given array is also in the second half. Your code must print `0` otherwise.

Example 1.



The code prints `0`, because none of the numbers in the first half is present in the second half.

Example 2.



The code prints `1`, because `6` from the first half is present in the second half.

Question 6 (20 points)

Assume that `b[][]` is a 2D array of characters of size $N \times N$ representing a chess board. Assume also that `r` and `c` are indices representing the position (row and column) of a rook (قلعة) on the chess board.

Write a piece of code that prints "unsafe" if there is another rook in the same column or in the same row as the rook at `b[r][c]`. Your code must print "safe" otherwise.

Assume that the board contains the character 'R' in a cell if there is a rook in that cell.

