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The King Hussein School for Computing Sciences
Department of Computer Science
Structured Programming - Fall 2022

First Exam

Full Name:

Solution

Student ID:

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

Circle your section:

- Dr. Rawan Ghnemat (section 1)
- Dr. Rawan Ghnemat (section 2)
- Dr. Mohammad Abu Snober (section 3)
- Ms. Rahmah Ibrahim (section 4)
- Mr. Alaa Altarazi (section 5)

Question 1 (5 points)

Write a program that reads three integers and outputs the closest pair.

Examples.

Input: 1 4 2 Output: 1 2

Input: 1 1 2 Output: 1 1

Input: 5 3 1 Output: 3 1

Input: 2 2 2 Output: 2 2

```
int main() {
    int a, b, c;
    scanf("%d%d%d", &a, &b, &c);

    int diff1 = a - b;
    if (diff1 < 0)
        diff1 *= -1;
    int diff2 = a - c;
    if (diff2 < 0)
        diff2 *= -1;
    int diff3 = c - b;
    if (diff3 < 0)
        diff3 *= -1;

    if (diff1 < diff2 && diff1 < diff3)
        printf("%d %d", a, b);
    else if (diff2 < diff1 && diff2 < diff3)
        printf("%d %d", a, c);
    else
        printf("%d %d", b, c);
    return 0;
}
```

Question 2 (5 points)

Write a program that reads a number N and computes $R = N + 10^d$, where d is the number of digits in N . The program should then print R to the screen.

Examples.

Input: 5	Output: 15	($R = 10^1 + 5$)
Input: 912	Output: 1912	($R = 10^3 + 912$)
Input: 53199	Output: 153199	($R = 10^5 + 53199$)

You can assume that $N > 0$ (no need to check for this).

```
int main() {
    int d = 0;
    int N;
    scanf("%d", &N);
    int n = N;

    while (N > 0) {
        d++;
        N /= 10;
    }

    int p = 1;
    for (int i = 0; i < d; i++)
        p *= 10;

    printf("%d", n + p);
}
```

Question 3 (5 points)

Given two integer arrays named `a[]` and `b[]` of size `N` each, write a piece of code that copies the even numbers from `a[]` into the beginning of `b[]` and fills the remaining spots in `b[]` with zeros.

Examples.

`a[] = {1, 2, 8, 4, 5}` `b[]` should become: `{2, 8, 4, 0, 0}`

`a[] = {1, 2, 3, 4, 6}` `b[]` should become: `{2, 4, 6, 0, 0}`

`a[] = {0, 2, 8, 4, 2}` `b[]` should become: `{0, 2, 8, 4, 2}`

`a[] = {1, 7, 3, 1, 5}` `b[]` should become: `{0, 0, 0, 0, 0}`

```
int k = 0;
for (int i = 0; i < N; i++) {
    if (a[i] % 2 == 0) {
        b[k] = a[i];
        k++;
    }
}

for (int i = k; i < N; i++)
    b[i] = 0;
```

Question 4 (5 points)

Given an integer array named `a[]` of size `N`, write a piece of code that swaps the first even number in the array with the last even in the array. If there is no swap to be made, output an error message.

Examples.

`a[] = {1, 2, 8, 4, 1}`

`a[]` should become: `{1, 4, 8, 2, 1}`

`a[] = {4, 2, 8, 4, 6}`

`a[]` should become: `{6, 2, 8, 4, 4}`

`a[] = {4, 0, 1, 3, 1}`

`a[]` should become: `{0, 4, 1, 3, 1}`

`a[] = {1, 2, 3, 5, 7}`

output: ERROR: NO SWAP TO BE MADE

`a[] = {1, 5, 3, 5, 7}`

output: ERROR: NO SWAP TO BE MADE

```
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)
    printf("No swap needed\n");
else {
    int temp = a[i];
    a[i] = a[j];
    a[j] = temp;
}
```

Question 5 (5 points)

Write a program that reads a sequence of 1000 integers and outputs the number of peaks. A peak is three numbers where the middle is larger than the one to its left and larger than the one to its right.

Examples.

1 1 2 3 4 1 1 1 0

There is only 1 peak in this sequence.

1 2 1 3 4 1 1 9 8

There are 3 peaks in this sequence.

1 1 5 3 4 3 1 1 0

There are 2 peaks in this sequence: 1 5 3 and 3 4 3.

1 1 5 5 2 3 3 1 0

There are no peaks in this sequence

Note. You are **not** allowed to use arrays in this question.

```
int main()
{
    int num, prev, next;
    scanf("%d%d", &prev, &num);

    int count = 0;
    for (int i = 0; i < 998; i++)
    {
        scanf("%d", &next);
        if (num > prev && num > next)
            count++;
        prev = num;
        num = next;
    }

    printf("%d", count);
    return 0;
}
```