MIDTERM EXERCISE

TA TIME

BEFORE

- Lab
  - Lab 2 第三題
    - 偏難，因為有特殊的測資 **(Sorry!)**
  - 以後 Lab難度
    - Lab 2 第二題
- Homework
  - 不計分，難度會比 Lab 更難，會含有一些特殊測資
  - TLE, WA
    - 注意測資的範圍
    - 代表著一定有更好的方法
  - **TA Time: 今日 8:30 ~ Delta 614**

THE NUMBER OF OCCURRENCES

- **Statement**
  - **Find the maximum number of occurrences**
- **Sample Input**
  - **12**
  - **4**
  - **12112212**
  - **12121212**
  - **111222**
  - **12112**
- **Sample Output**
  - **4**

THE NUMBER OF OCCURRENCES

- **Hint**
  - 可以用 **strlen(A) strlen(B)** 取得**A**與**B**的長度
  - 跑過每個 **B** 的 **index,** 並從每個**index**出發**,** 看是否成功找到 **A**
  - 計數總共找到幾組**A**
  - 找出最大值

PROGRESSION

- **Statement**
  - **Judge whether input is Arithmetic Progression or a Geometric Progression**
  - **Print out the first number and the 5th number**

- **Sample Input**
  - **2 -4 8**

- **Sample Output**
  - **-1 -16**

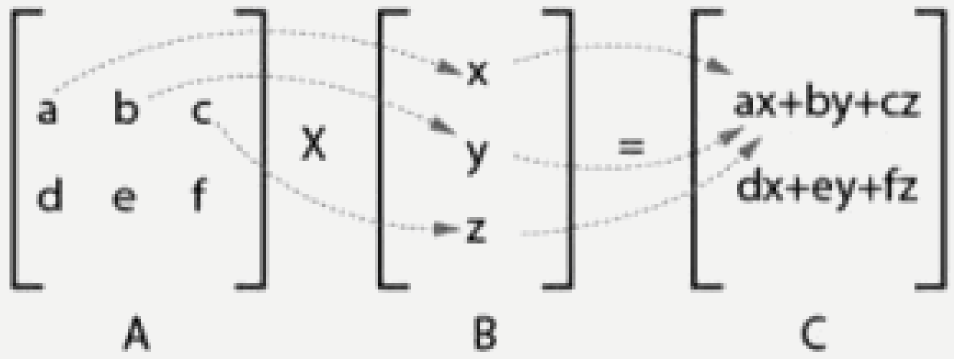
Easy!

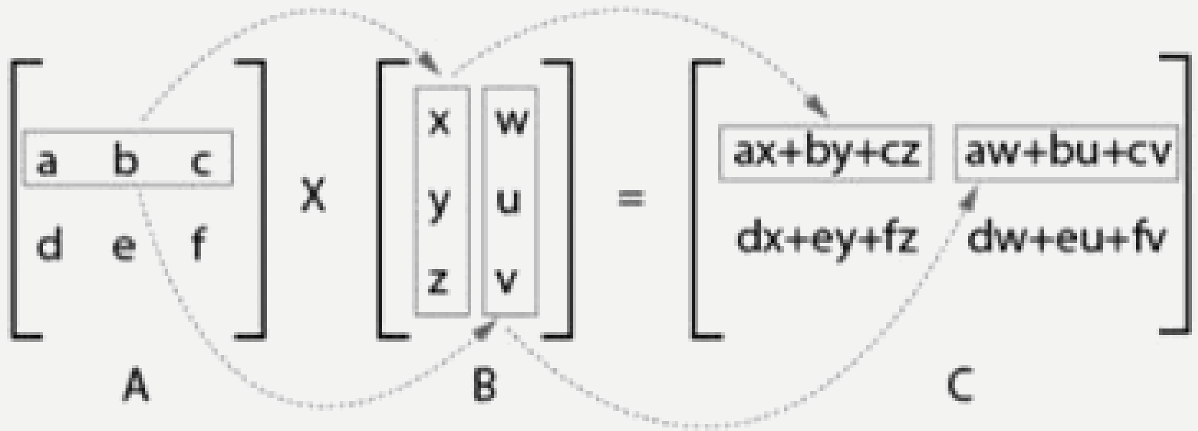
MATRIX MULTIPLICATION

- **Statement**
  - **Compute C = A × B, where A, B and C are matrices of size *n* × *m*, *m* × *p*, and *n* × *p*, respectivily.**

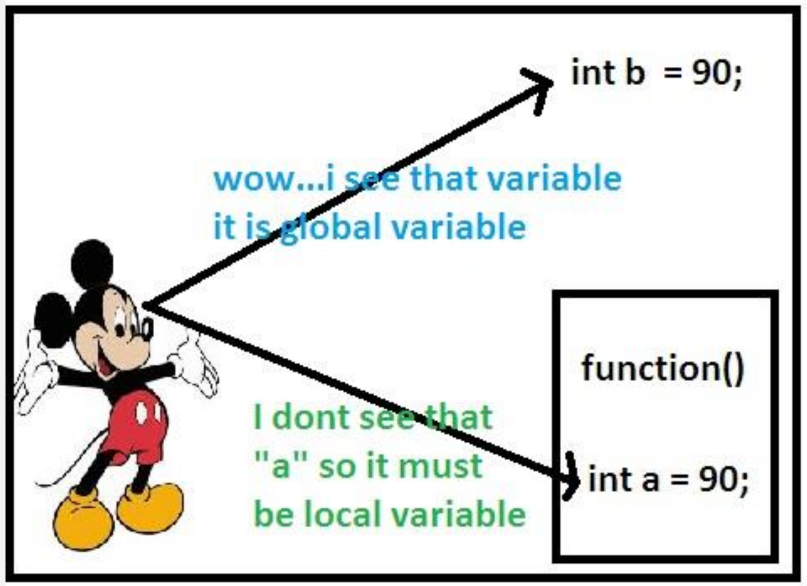
- **Sample Input**
  - **1 1 1**
  - **814**
  - **819**

- **Sample Output**
  - **666666**

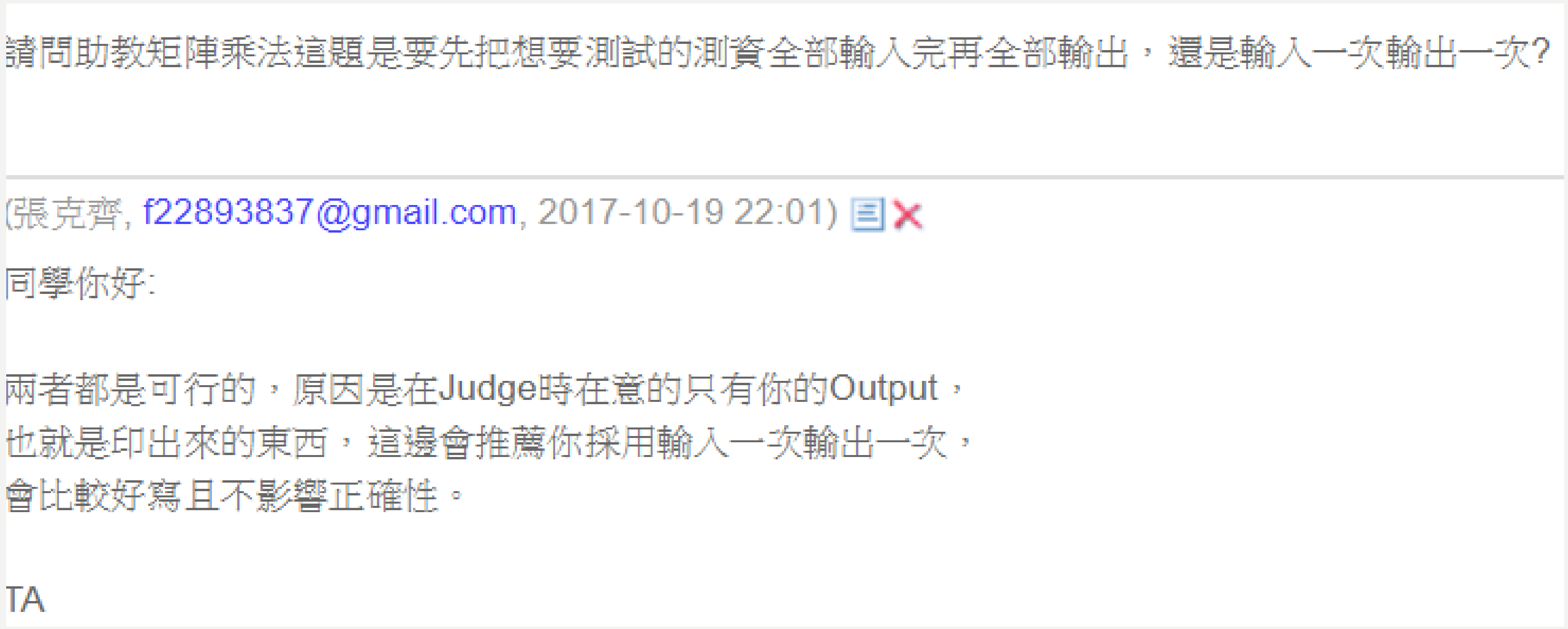




MATRIX MULTIPLICATION



- **Hint**
  - 3 level for loop
  - Aware of variable range
    - For data set #4, $1 \leq n, m, p \leq 100$ and $|aij|, |bij| \leq 10000$.
    - Declare 2D-Array as global variable(討論區164256)
    - $100*10000*10000 = 10^{10} > 10^9$
      - (-2,147,483,648 to 2,147,483,647 for int range)
    - It will not be your testcase forever at Lab in the future


請問助教矩陣乘法這題是要先把想要測試的測資全部輸入完再全部輸出，還是輸入一次輸出一次?

(張克齊, f22893837@gmail.com, 2017-10-19 22:01)

同學你好:

兩者都是可行的，原因是在Judge時在意的只有你的Output，
也就是印出來的東西，這邊會推薦你採用輸入一次輸出一次，
會比較好寫且不影響正確性。

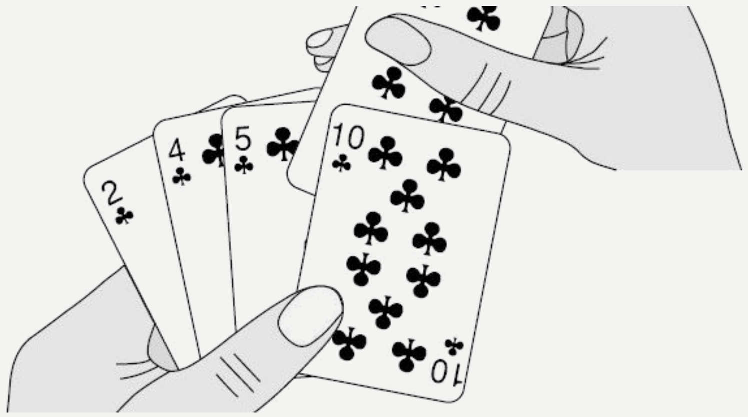
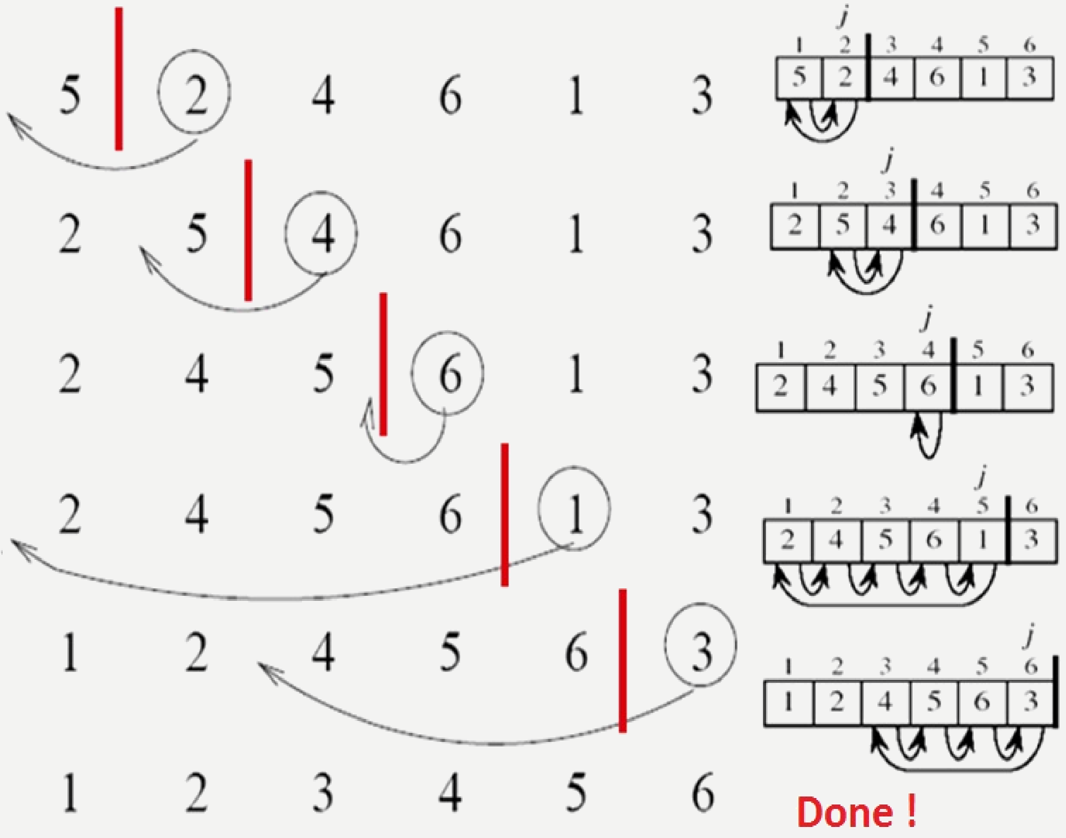
TA

SIMPLE INTEGER SORTING

- **Statement**
  - **List items in increasing order**
- **Sample Input**
  - **5**
  - **4 5 3 1 2**
- **Sample Output**
  - **1 2 3 4 5**

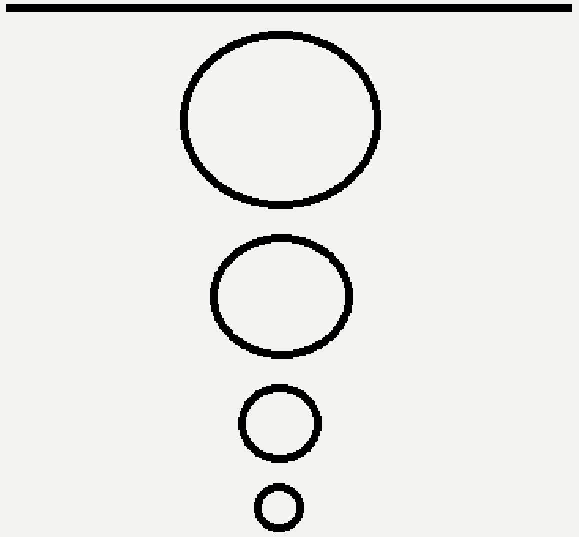
SIMPLE INTEGER SORTING

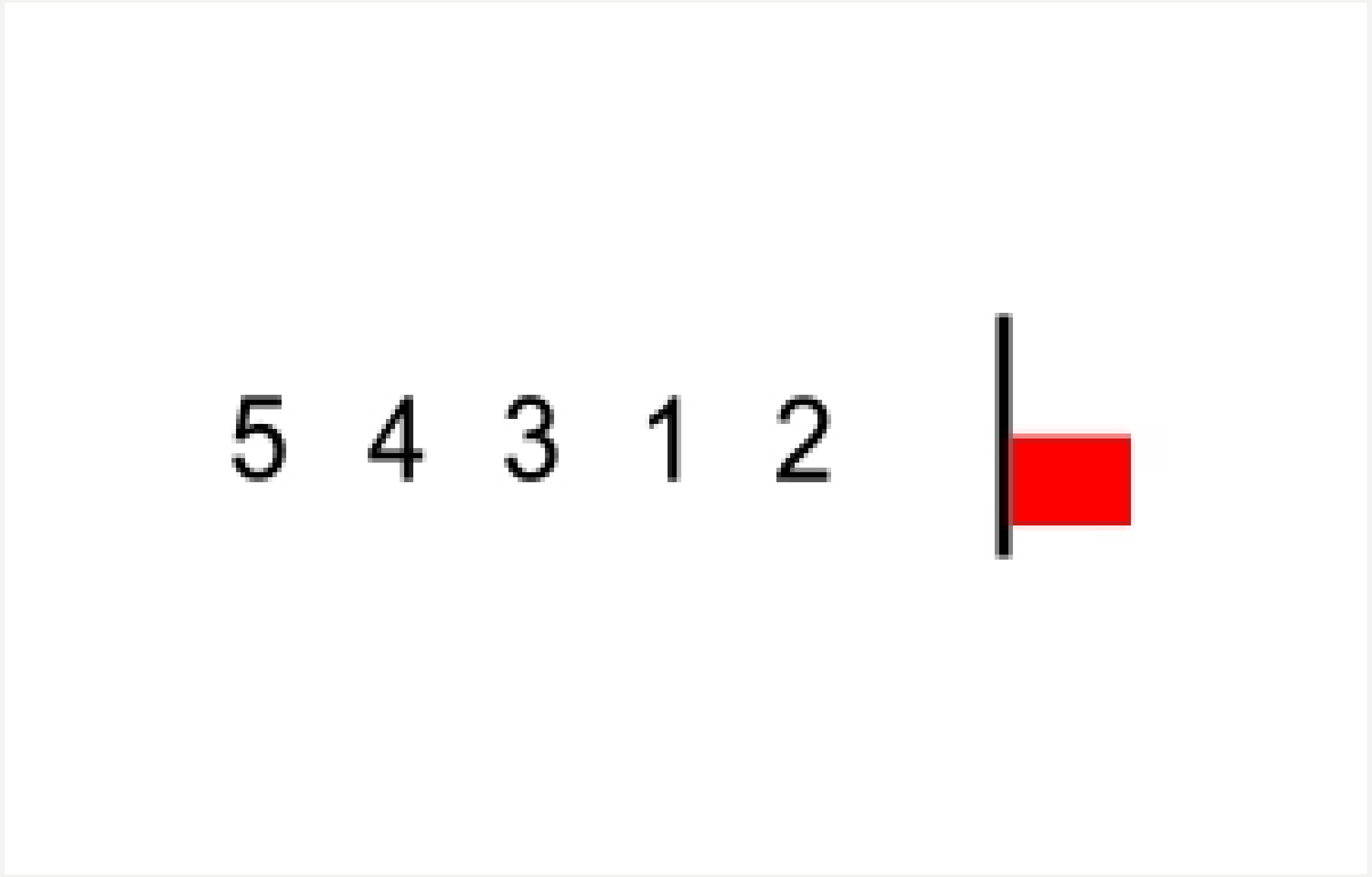
- **Insertion Sort**
  - goo.gl/nNwKCH

SIMPLE INTEGER SORTING

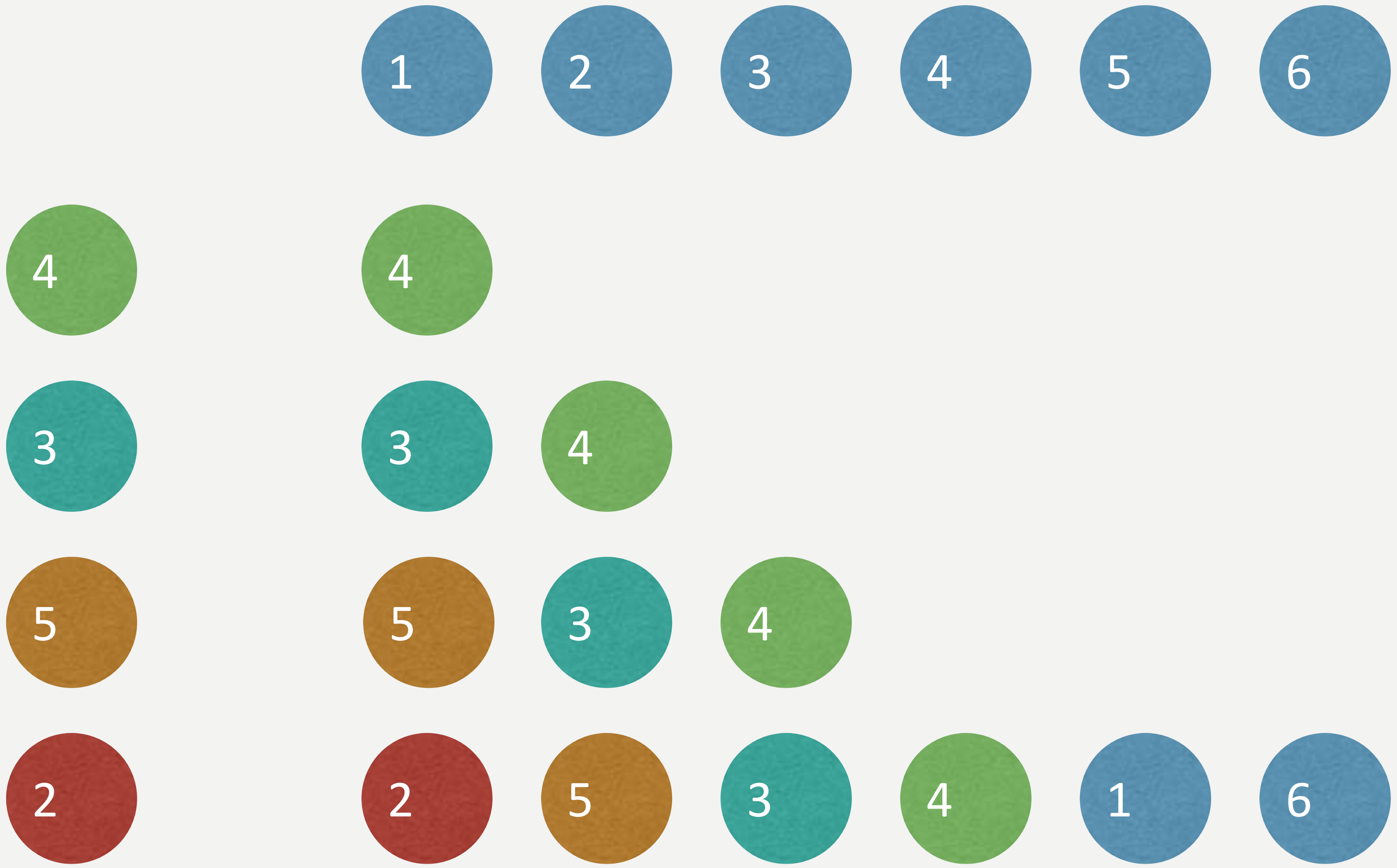
- **Bubble Sort**
  - **Flag**
  - goo.gl/WJZ7iL





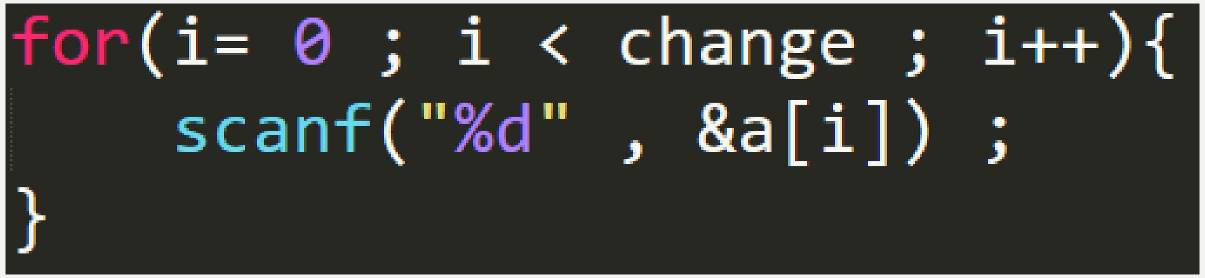
PA – ARRANGING A SEQUENCE

- Description
  - Maintain a sequence that when you input a number , the number will go to the first position of the sequence and you need to print out the sequence when the input end
- Concept
  - When taking the assigned number to the first place, others after it will forward one place.
  - The last input will be the first output number

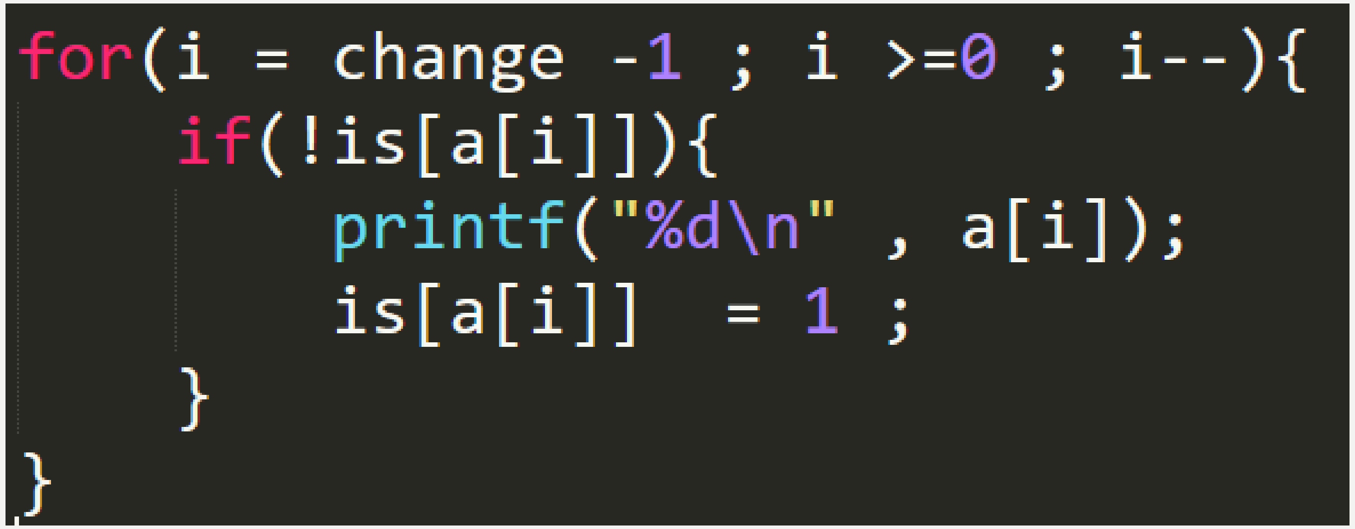

1 2 3 4 5 6
4 4
3 3 4
5 5 3 4
2 2 5 3 4 1 6

PA – ARRANGING A SEQUENCE

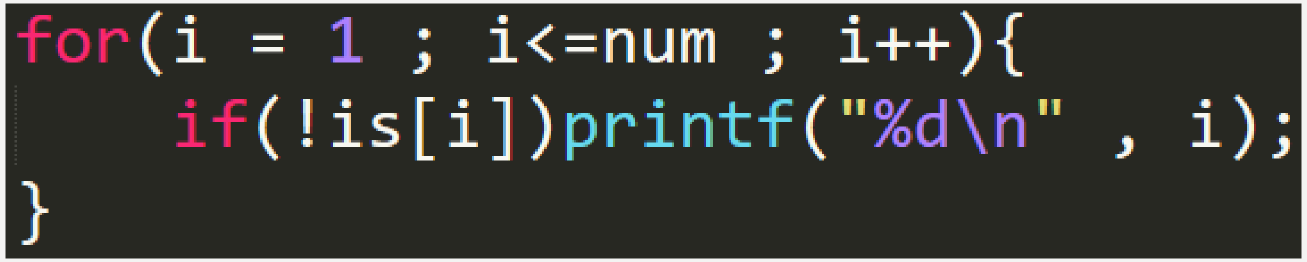
- **Implementation**
  - **Maintain an array, store the number which we want to pick it to the first**
  - **From the last to the first , maintain an array if the number doesn’t appear print it**
  - **From the first to the last , if the number didn’t change the position , print it out**



```c
for(i= 0 ; i < change ; i++){
    scanf("%d" , &a[i]) ;
}
```



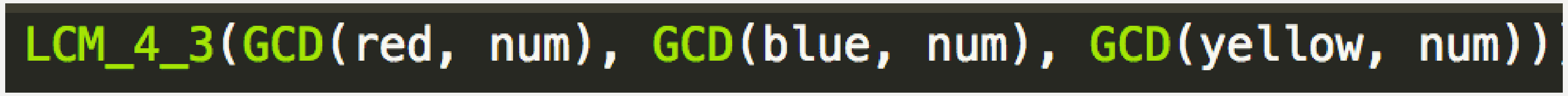
```c
for(i = change -1 ; i >=0 ; i--){
    if(!is[a[i]]){
        printf("%d\n" , a[i]);
        is[a[i]]  = 1 ;
    }
}
```



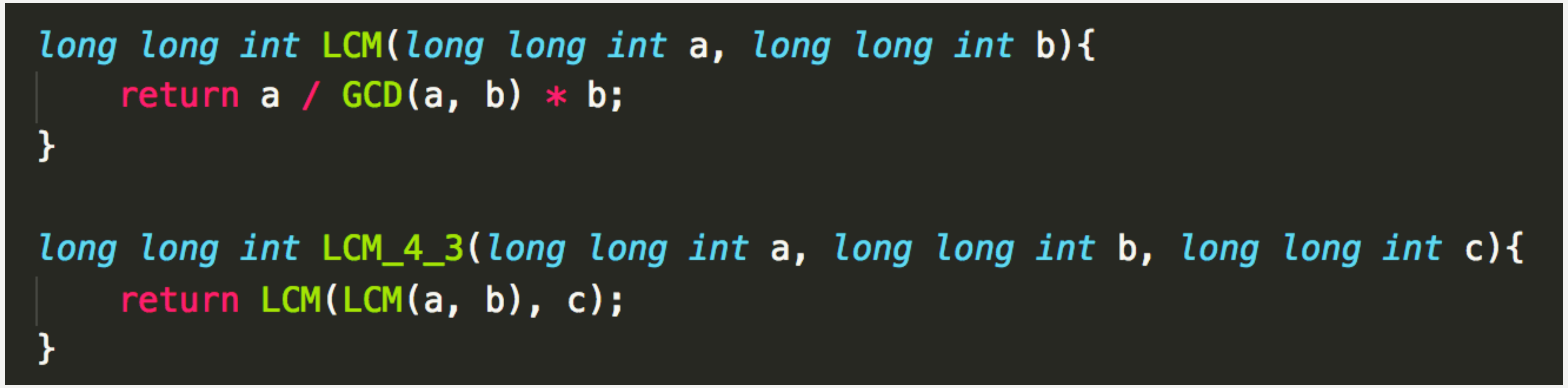
```c
for(i = 1 ; i<=num ; i++){
    if(!is[i])printf("%d\n" , i);
}
```

PB – BIRTHDAY PARTY

- long long int
- LCM(GCD between x, y, z and ponies)



```
LCM_4_3(GCD(red, num), GCD(blue, num), GCD(yellow, num))
```

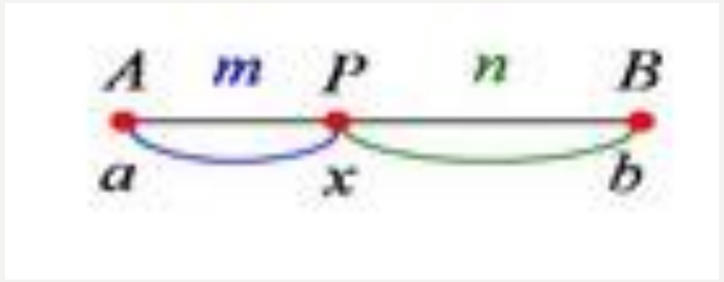


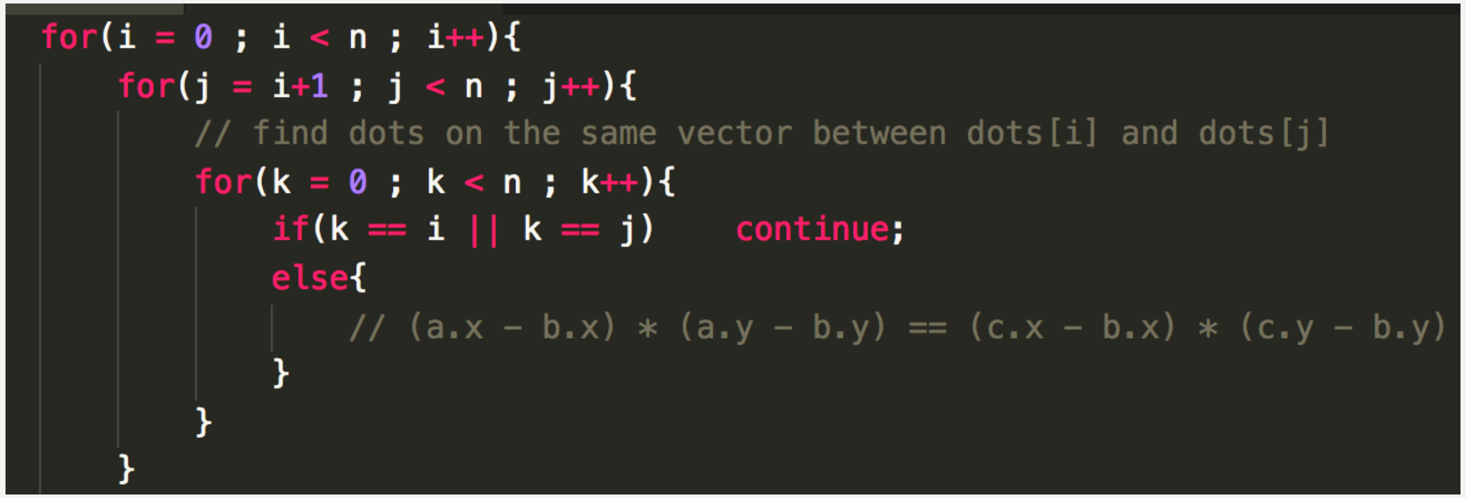
```
long long int LCM(long long int a, long long int b){
    return a / GCD(a, b) * b;
}

long long int LCM_4_3(long long int a, long long int b, long long int c){
    return LCM(LCM(a, b), c);
}
```

PC - COLLINEAR

- 3 finite loops to compare any 2 points with the rest points

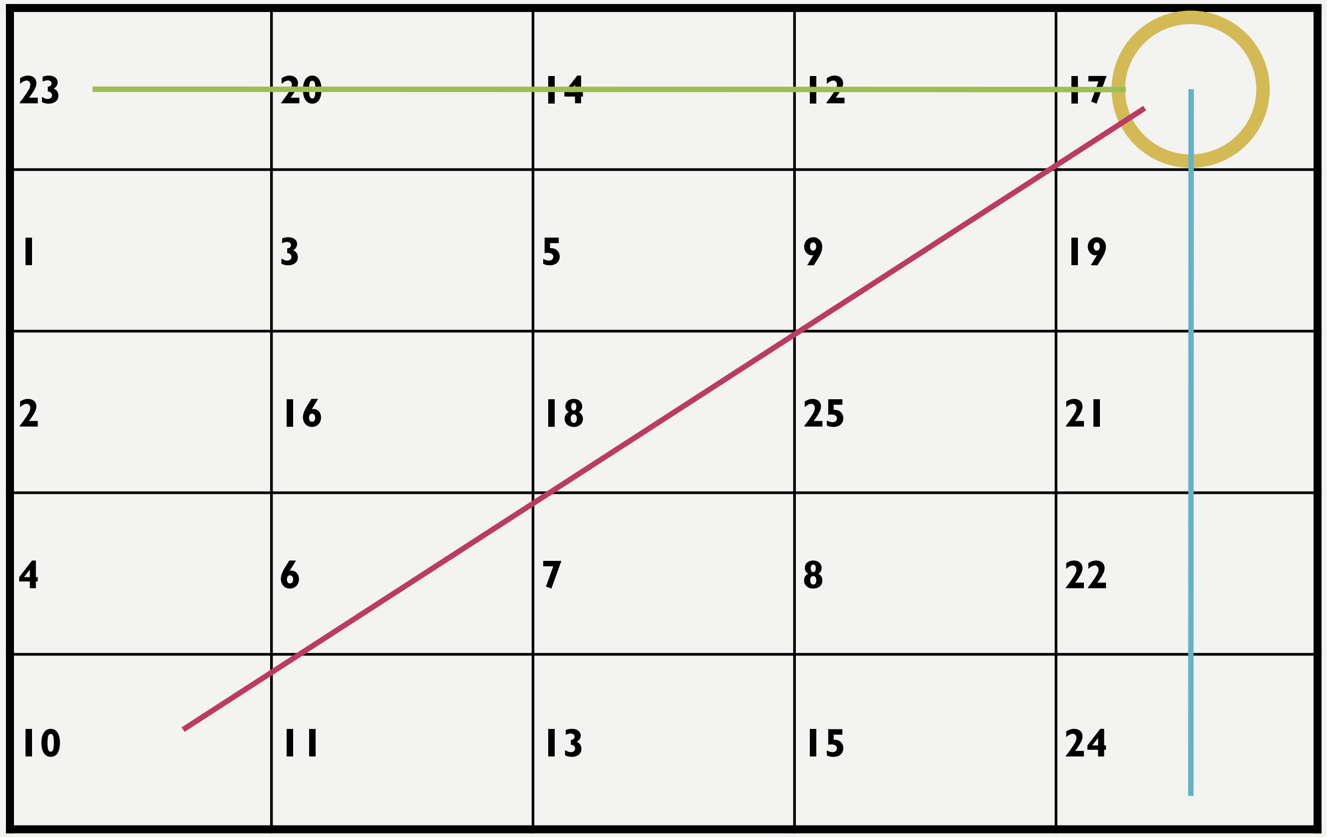




```
for(i = 0 ; i < n ; i++){
    for(j = i+1 ; j < n ; j++){
        // find dots on the same vector between dots[i] and dots[j]
        for(k = 0 ; k < n ; k++){
            if(k == i || k == j)    continue;
            else{
                // (a.x - b.x) * (a.y - b.y) == (c.x - b.x) * (c.y - b.y)
            }
        }
    }
```

PD – DISTRAIT

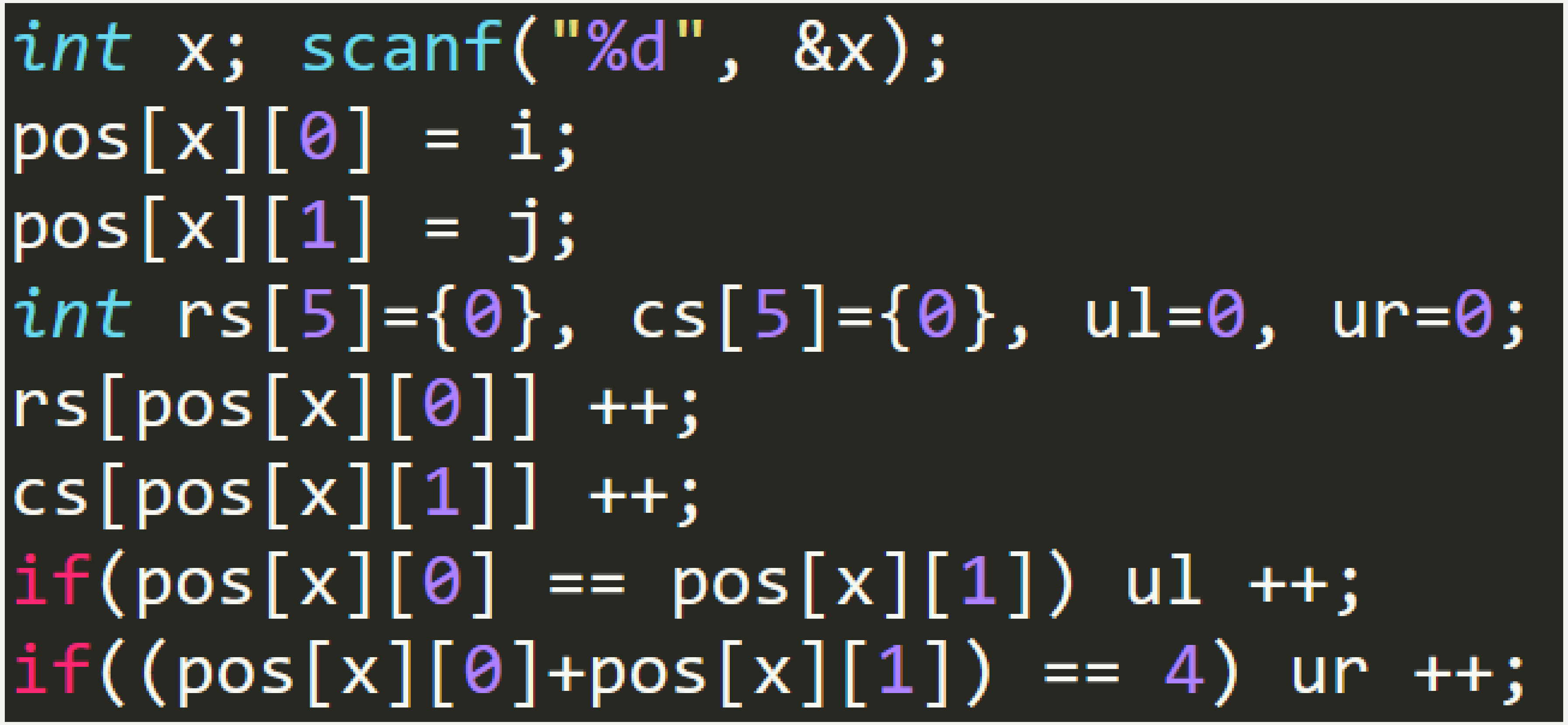
- Description
  - Judge that if you can bingo or not , if you can , print which step we will bingo , if not , print Not yet \(^o^)/
- Concept
  - Every time you can search whether you can bingo or not
  - Remember the row and column of the input number and only test this row and column



23	20	14	12	17
1	3	5	9	19
2	16	18	25	21
4	6	7	8	22
10	11	13	15	24

PD – DISTRAIT

- Implementation
  - Recall the index of the input data
  - Judge that if the number we give will make the bingo condition satisfied



```c
int x; scanf("%d", &x);
pos[x][0] = i;
pos[x][1] = j;
int rs[5]={0}, cs[5]={0}, ul=0, ur=0;
rs[pos[x][0]] ++;
cs[pos[x][1]] ++;
if(pos[x][0] == pos[x][1]) ul ++;
if((pos[x][0]+pos[x][1]) == 4) ur ++;
```

PE – EXQUISITE SUBSTRINGS

- **String S - “PlayerUnknowns BattleGrounds”**
- **A Substring of a string S is a string S’ that occurs in S.**
- **For example, “BattleGrounds” is a substring (S’).**

- **The list of all substrings of the string “Dude” would be**
- **“Dude”, “Dud”, “ude”, “Du”, “ud”, “de”, “D”, “u”, “d”, “e”.**

PE – EXQUISITE SUBSTRINGS

- **A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward as forward, such as *AAAA* or *DudeduD*.**

- **In problem 11621 :**

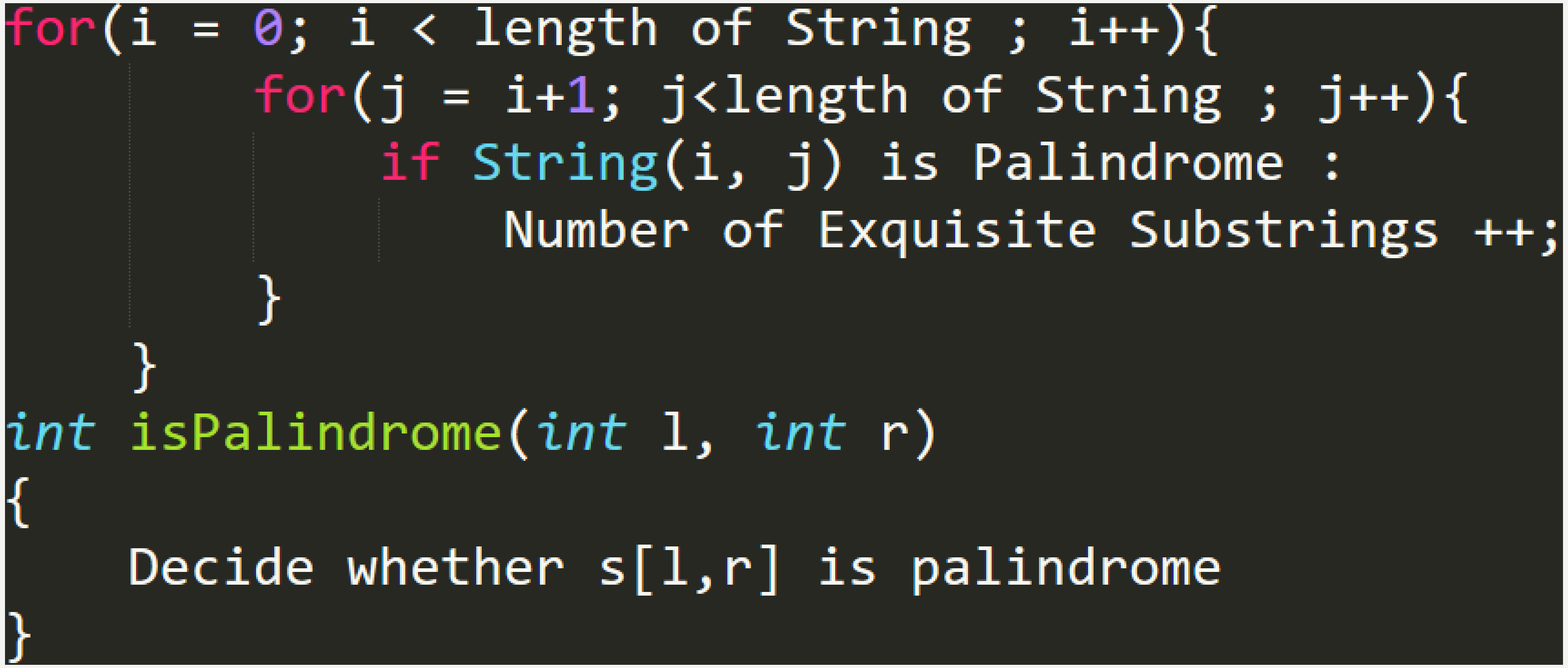
  HT discovered that for some special string *s*, he could find two distinct indices *l* and *r* such that if he reverses the substring *s[l, r]*

PE – EXQUISITE SUBSTRINGS

Input :	Output:
abcd	0
abab	2
aaaaa	10

PE – EXQUISITE SUBSTRINGS

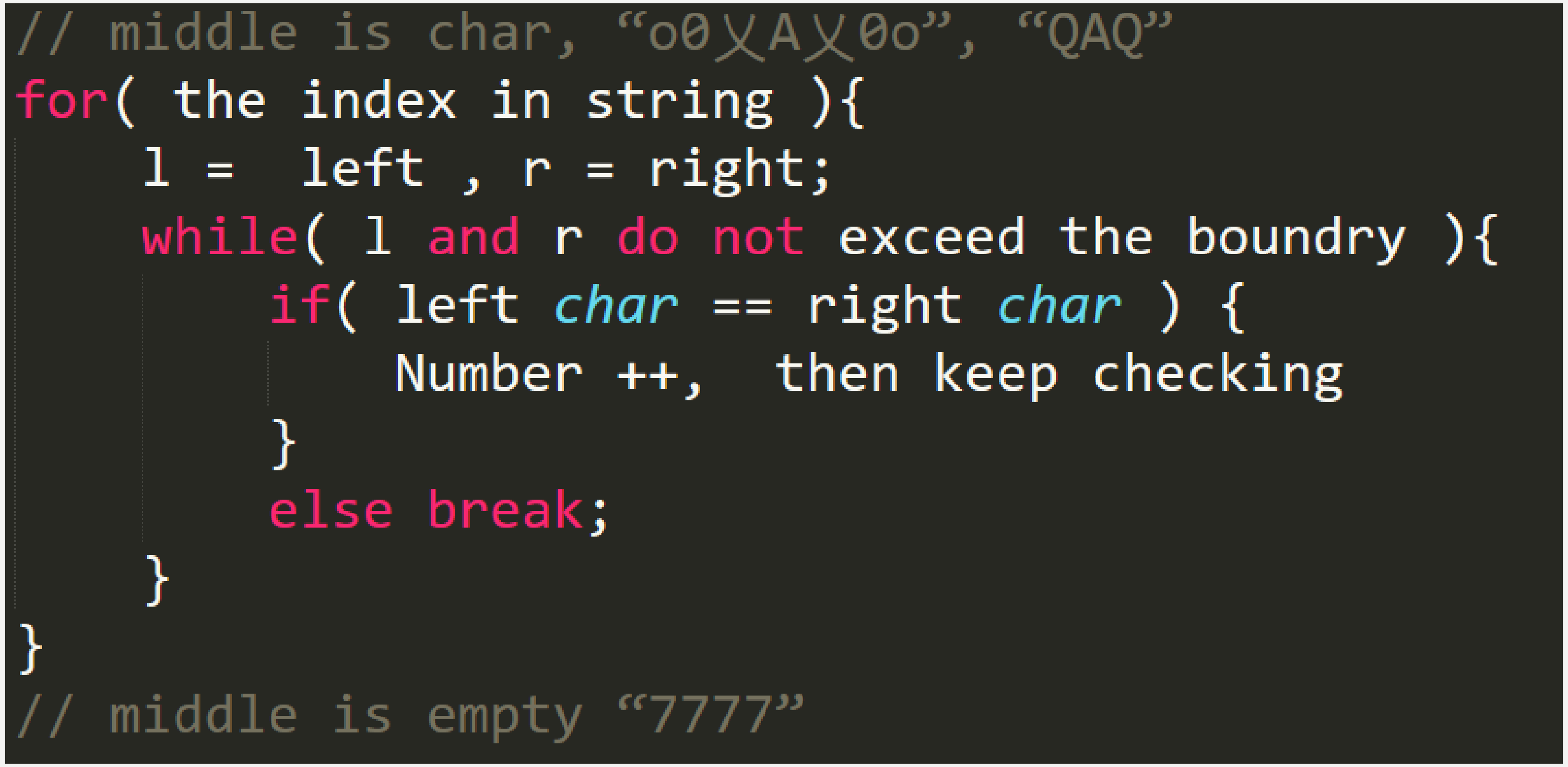
- **Solution**



```
for(i = 0; i < length of String ; i++){
        for(j = i+1; j<length of String ; j++){
            if String(i, j) is Palindrome :
                Number of Exquisite Substrings ++;
        }
    }
int isPalindrome(int l, int r)
{
    Decide whether s[l,r] is palindrome
}
```

PE – EXQUISITE SUBSTRINGS

- **Solution**



```
// middle is char, “o0乂A乂0o”, “QAQ”
for( the index in string ){
    l =  left , r = right;
    while( l and r do not exceed the boundry ){
        if( left char == right char ) {
            Number ++,  then keep checking
        }
        else break;
    }
}
// middle is empty “7777”
```

PF – FULL HOUSE

- For those who do not know what full house is :
  - https://zh.wikipedia.org/wiki/赌侠

同花打不打得過full house?
You can't beat a full house by a flush.

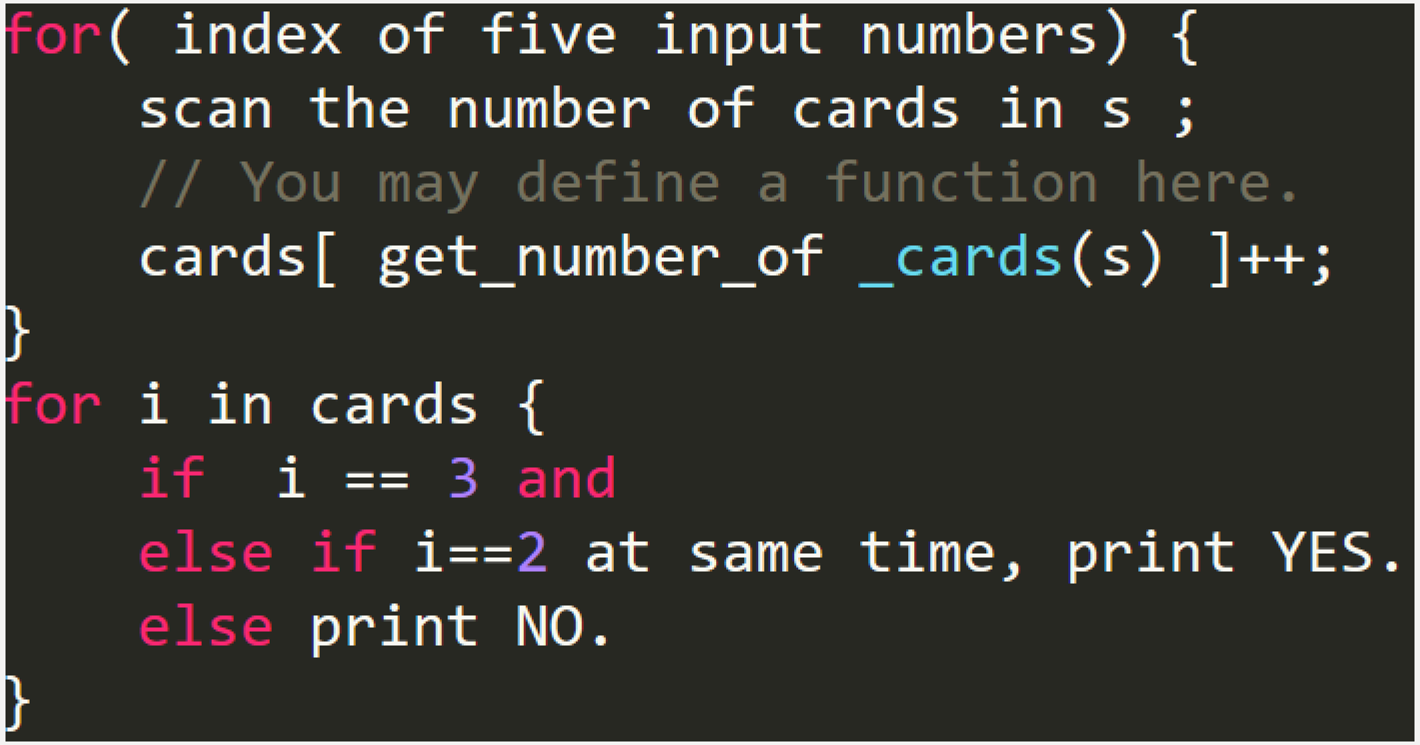
PF – FULL HOUSE

- Input :
  - 5
  - 2 3 4 5 6
  - 2 2 2 2 A
  - 3 3 3 4 4
  - 2 A 2 A 2
  - 3 3 2 2 2
- Output :
  - NO
  - NO
  - YES
  - YES
  - YES

- Note that cards include A, 2, …, 10, J , Q , K

PF – FULL HOUSE

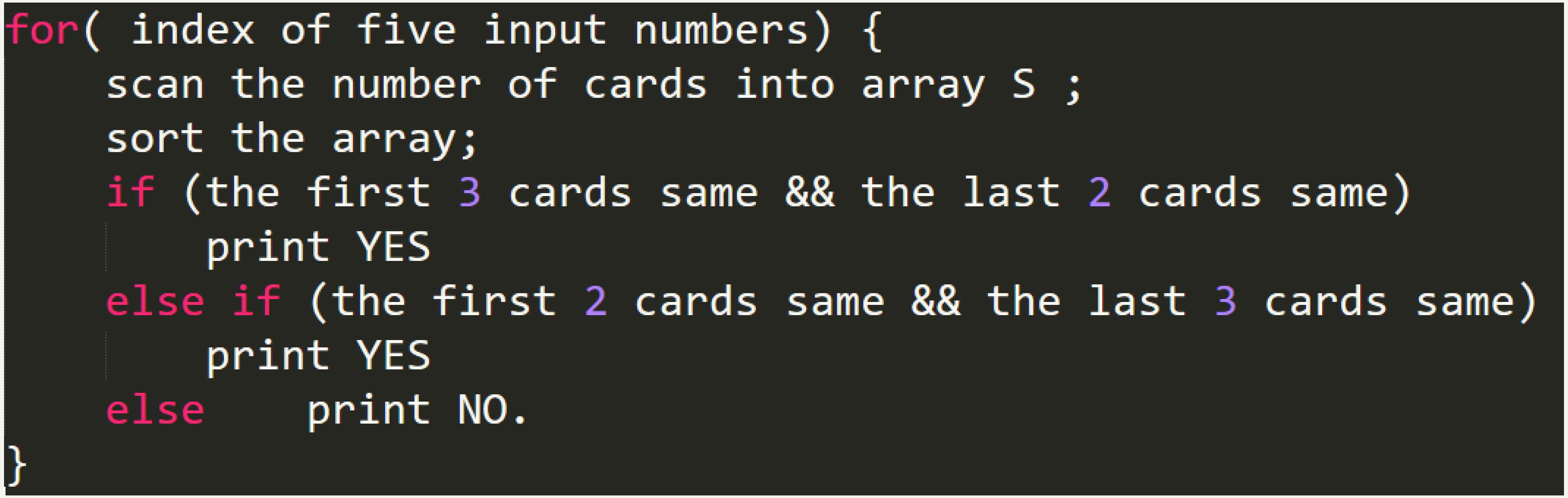
- **Solution 1**



```
for( index of five input numbers) {
    scan the number of cards in s ;
    // You may define a function here.
    cards[ get_number_of _cards(s) ]++;
}
for i in cards {
    if  i == 3 and
    else if i==2 at same time, print YES.
    else print NO.
}
```

PF – FULL HOUSE

- Solution 2



```
for( index of five input numbers) {
    scan the number of cards into array S ;
    sort the array;
    if (the first 3 cards same && the last 2 cards same)
        print YES
    else if (the first 2 cards same && the last 3 cards same)
        print YES
    else    print NO.
}
```