#include <iostream>

using namespace std;

// Counting Sort

void countingSort(int \*arr,int len){

int big;

big = arr[0];

int a[len];

for(int i = 1; i < len; i++){

if( arr[i] > big){

big = arr[i];

}

}

int newArray[++big];

for(int i = 0; i < big; i++ ){

newArray[i] = 0;

}

for(int i = 0; i < len; i++){

newArray[ arr[i] ]++;

}

for(int i = 1; i < big; i++){

newArray[i] = newArray[i-1] + newArray[i];

}

for(int i = 0; i < len; i++){

a[ newArray[ arr[i] ] - 1 ] = arr[i];

newArray[ arr[i] ]--;

}

for(int i = 0; i < len; i++){

arr[i] = a[i];

}

}

// Binary Search

int binarySearch(int \*arr, int beg, int ending, int item){

int mid = (beg+ending)/2;

while(beg <= ending && arr[mid] != item){

if( arr[mid] < item ){

beg = mid +1;

}else{

ending = mid -1;

}

mid = (beg+ending)/2;

}

if(arr[mid] == item){

return mid;

}else{

return -1;

}

}

// print array

void printArray(int \*a, int len){

for(int i =0; i< len; i++){

cout << a[i] << " ";

}

cout << endl;

}

// This is main function

int main()

{

int arr[] = {5,10,7,9,6,5,13,4,1,17,0,8};

// int arr[]={8,12,13,14,15};

int len = sizeof(arr) / sizeof(int);

// cout << binarySearch(arr,0,len-1,18);

int item = 13;

printArray(arr,len);

countingSort(arr,len);

cout << "\nSorted Array: ";

printArray(arr,len);

int newArray[len];

for(int i = 0; i < len; i++){

newArray[i] = item - arr[i];

}

cout << "\nSubtracted Array: ";

printArray(newArray,len);

int pos, a[len],j=0,counter, k =0 , b[len];

cout << endl << item << " --> ";

for(int i = 0; i < len; i++){

pos = binarySearch(arr,0,len-1,newArray[i]);

counter = binarySearch(a,0,j-1,pos);

if( pos >= 0 && pos != i && counter == -1 ){

a[j++] = i;

a[j++] = pos;

cout << "( "<< arr[ i ] << " , " << arr [ pos ] << " )";

countingSort(a,j);

}

counter = 0;

}

cout << endl;

return 0;

}