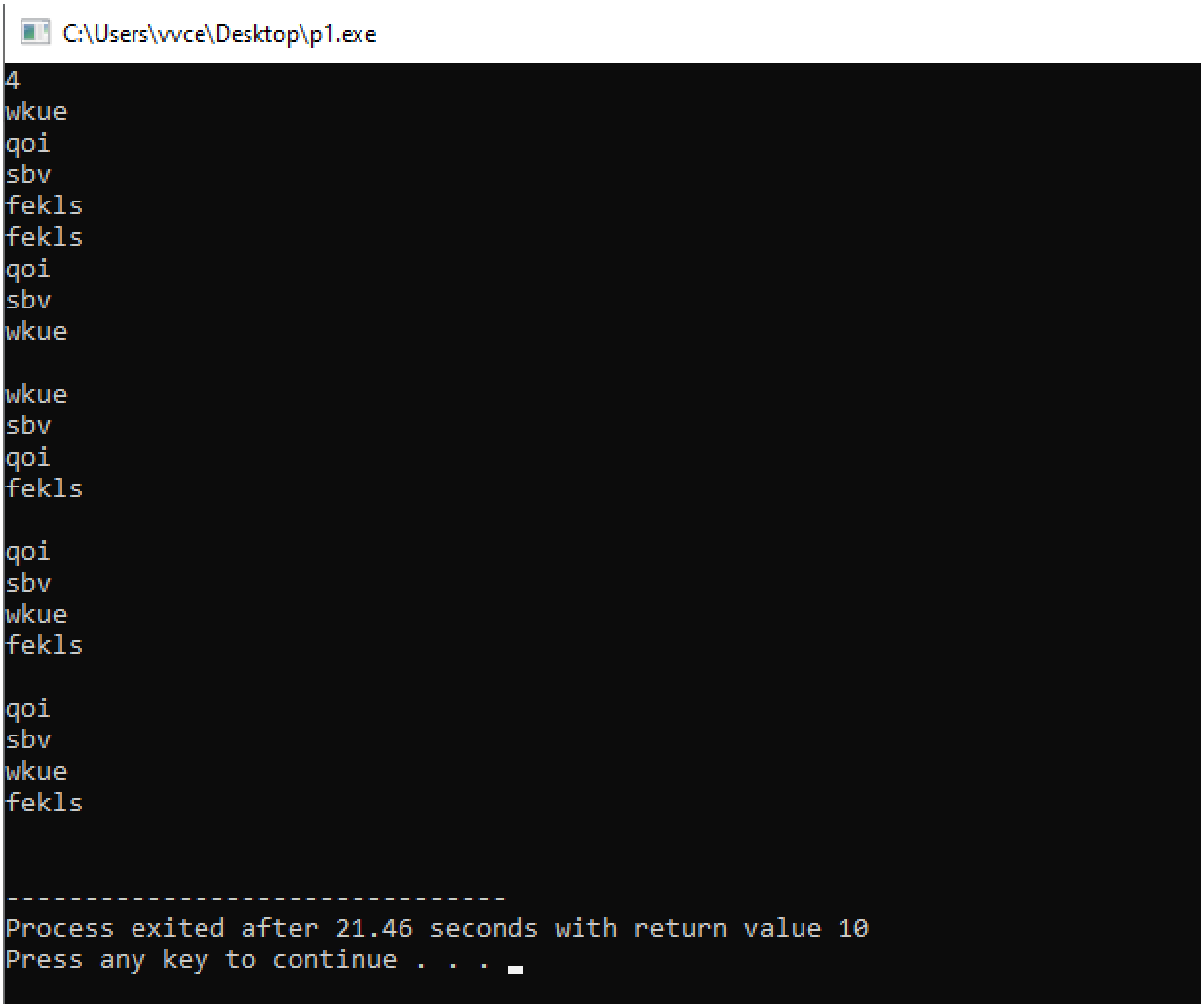
Module 4

SORTING ARRAY OF STRINGS

```
#include<string.h>
#include<stdio.h>
#include<stdlib.h>
int lexicographic_sort(const char* a, const char* b){
   return strcmp(a, b) > 0;
}

int lexicographic_sort_reverse(const char* a, const char* b){
   return strcmp(a, b) <= 0;
}

int sort_by_number_of_distinct_characters(const char* a, const char* b){
   int c1 = 0, c2 = 0;
   int hsh1[26] = {0}, hsh2[26] = {0};
   int n1 = strlen(a);
   int n2 = strlen(b);
   int i;

   for(i = 0; i < n1; i++){
      hsh1[a[i] - 'a'] = 1;
   }

   for(i = 0; i < n2; i++){
      hsh2[b[i] - 'a'] = 1;
   }

   for( i = 0; i < 26; i++){
      if(hsh1[i])
         c1++;
      if(hsh2[i])
         c2++;
   }
   if( c1 != c2)
      return c1 > c2;
   else
      return strcmp(a, b)  > 0;
```

```
}

int sort_by_length(const char* a, const char* b){
    if(strlen(a) != strlen(b))
        return strlen(a) > strlen(b);
    else
        return strcmp(a, b) >  0;
}

void string_sort(char** arr,const int len,int (*cmp_func)(const char* a, const char* b))
{   int i;
    for( i = 1; i < len; i++){
        int j = i;
        char* p = arr[i];
        while(j > 0){
            if((*cmp_func)(arr[j-1],p) > 0 )
                arr[j] = arr[j-1];
            else
                break;
            j--;
        }
        arr[j] = p;
    }
}

int main()
{
    int n,i;
    scanf("%d", &n);

    char** arr;
             arr = (char**)malloc(n * sizeof(char*));

    for(i = 0; i < n; i++){
        *(arr + i) = malloc(1024 * sizeof(char));
        scanf("%s", *(arr + i));
        *(arr + i) = realloc(*(arr + i), strlen(*(arr + i)) + 1);
    }

    string_sort(arr, n, lexicographic_sort);
    for(i = 0; i < n; i++)
```

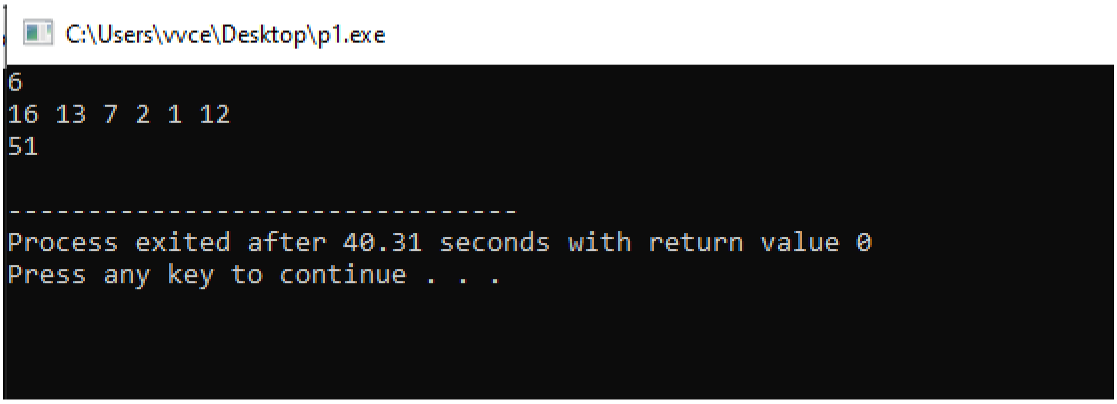
```
        printf("%s\n", arr[i]);
    printf("\n");

    string_sort(arr, n, lexicographic_sort_reverse);
    for(i = 0; i < n; i++)
        printf("%s\n", arr[i]);
    printf("\n");

    string_sort(arr, n, sort_by_length);
    for(i = 0; i < n; i++)
        printf("%s\n", arr[i]);
    printf("\n");

    string_sort(arr, n, sort_by_number_of_distinct_characters);
    for(i = 0; i < n; i++)
        printf("%s\n", arr[i]);
    printf("\n");
}
```



```
4
wkue
qoi
sbv
fekls
fekls
qoi
sbv
wkue

wkue
sbv
qoi
fekls

qoi
sbv
wkue
fekls

qoi
sbv
wkue
fekls



--------------------------------
Process exited after 21.46 seconds with return value 10
Press any key to continue . . .
```

1D ARRAYS IN C

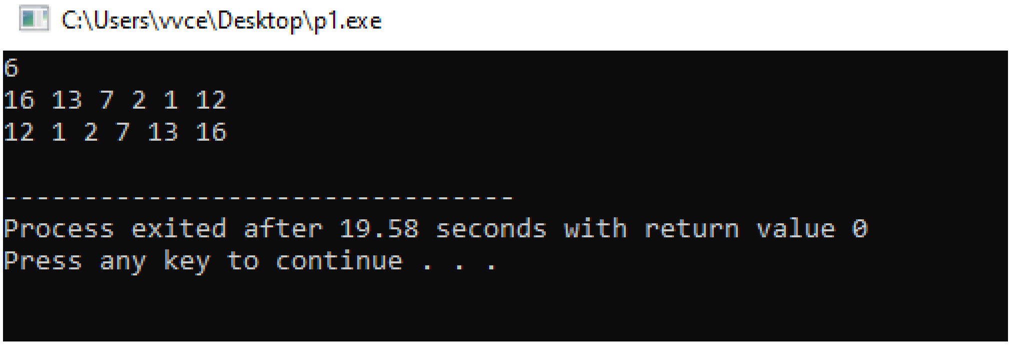
```
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int n;
    scanf("%d", &n);

    // Create a dynamic array of size n
    int* arr = (int*)malloc(n * sizeof(int));

    // Read the values from stdin and store them in the array
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    // Calculate the sum of all elements in the array
    int sum = 0;
    for (int i = 0; i < n; i++) {
        sum += arr[i];
    }

    printf("%d\n", sum);

    // Free the memory where the array is stored
    free(arr);

    return 0;
}
```



```
6
16 13 7 2 1 12
51

--------------------------------
Process exited after 40.31 seconds with return value 0
Press any key to continue . . .
```

Array Reversal

```
#include <stdio.h>

#include <stdlib.h>

int main() {

int n, arr[1000], i;

scanf("%d", &n);

for (i = 0; i < n; i++)

scanf("%d", &arr[i]);

for (i = n - 1; i >= 0; i--)

printf("%d ", arr[i]);

printf("\n");

return 0;

}
```



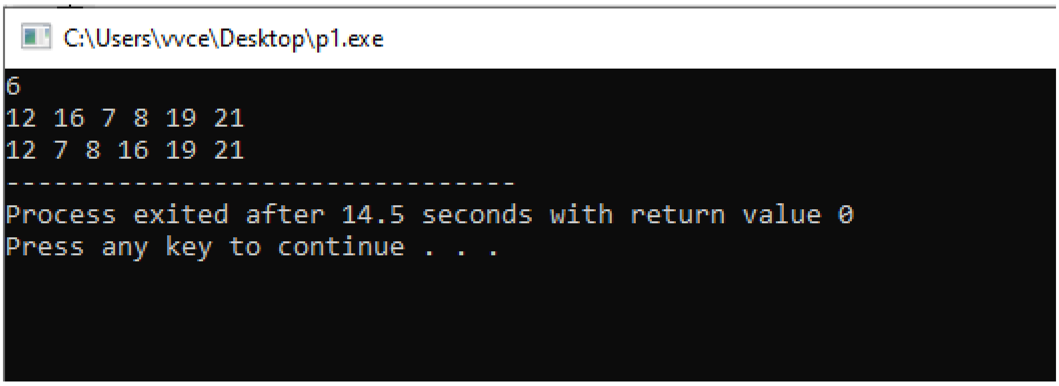
C:\Users\vvce\Desktop\p1.exe

```
6
16 13 7 2 1 12
12 1 2 7 13 16

--------------------------------
Process exited after 19.58 seconds with return value 0
Press any key to continue . . .
```

Binary Search Tree: Insertion

```
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>
```

```
struct node {

    int data;
    struct node *left;
    struct node *right;

};

void preOrder( struct node *root) {

             if( root == NULL )
      return;
             printf("%d ",root->data);
             preOrder(root->left);
             preOrder(root->right);

}
struct node* insert(struct node* root, int data) {

    if (root == NULL) {
        struct node* newNode = (struct node*)malloc(sizeof(struct node));
        newNode->data = data;
        newNode->left = NULL;
        newNode->right = NULL;
        return newNode;
    }

    if (data < root->data) {
        root->left = insert(root->left, data);
    } else {
        root->right = insert(root->right, data);
    }


    return root;
}


int main() {

    struct node* root = NULL;
    int t;
    int data;

    scanf("%d", &t);

    while(t-- > 0) {
        scanf("%d", &data);
        root = insert(root, data);
    }

            preOrder(root);
    return 0;
}
```



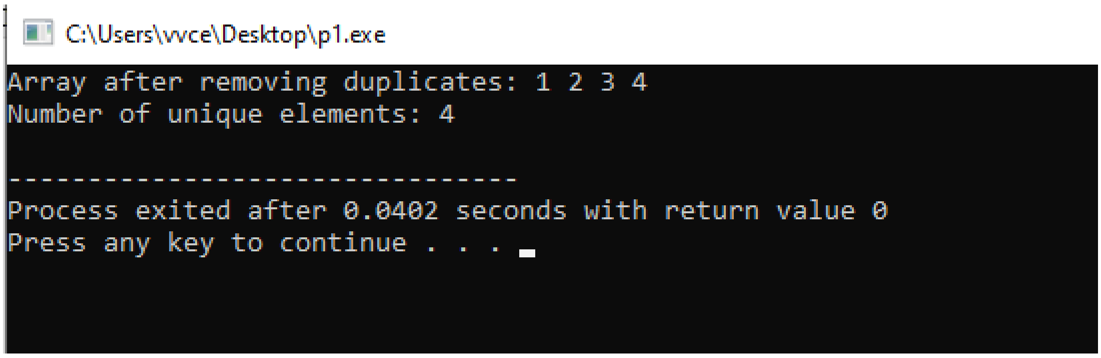
C:\Users\vvce\Desktop\p1.exe

```
6
12 16 7 8 19 21
12 7 8 16 19 21
--------------------------------
Process exited after 14.5 seconds with return value 0
Press any key to continue . . .
```

Remove Duplicates from Sorted Array

```
#include <stdio.h>

// Function to remove duplicates from a sorted array

int removeDuplicates(int* nums, int numsSize) {

// Edge case: if the array is empty, no unique elements exist

if (numsSize == 0) {

return 0;

}

// k will track the index of the last unique element

int k = 1;
int i;
// Start from the second element (index 1)
for (i = 1; i < numsSize; i++) {
// If the current element is different from the previous one, it's unique
if (nums[i] != nums[i - 1]) {
// Place the unique element at position k
nums[k] = nums[i];
k++; // Increment k to track the number of unique elements
}
}
// Return the number of unique elements
return k;
}
// Main function to test the removeDuplicates function
int main() {
// Example input
int nums[] = {1, 1, 2, 2, 3, 3, 4};
int i;
int numsSize = sizeof(nums) / sizeof(nums[0]);
// Calling removeDuplicates function
int newSize = removeDuplicates(nums, numsSize);
// Print the modified array and the number of unique elements
printf("Array after removing duplicates: ");
for (i = 0; i < newSize; i++) {
printf("%d ", nums[i]);
}
printf("\n");
printf("Number of unique elements: %d\n", newSize);
```

```
return 0;

}
```



```
Array after removing duplicates: 1 2 3 4
Number of unique elements: 4

--------------------------------
Process exited after 0.0402 seconds with return value 0
Press any key to continue . . .
```