# Lab Assignment 6

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**Contents**

# 1

## 1.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[10];
    for (int i = 0; i < 10; ++i)
    {
        printf("\n Address of element no. %d: %p", i + 1, &a[i]);
        // & operator gets the address of specified element
    }
    printf("\n\n\n");
    return 0;
}
```

## 1.2 Output

```
Address of element no. 1: 0x7fff0700ae40
Address of element no. 2: 0x7fff0700ae44
Address of element no. 3: 0x7fff0700ae48
Address of element no. 4: 0x7fff0700ae4c
Address of element no. 5: 0x7fff0700ae50
Address of element no. 6: 0x7fff0700ae54
Address of element no. 7: 0x7fff0700ae58
Address of element no. 8: 0x7fff0700ae5c
Address of element no. 9: 0x7fff0700ae60
Address of element no. 10: 0x7fff0700ae64
```

# 2

## 2.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a = 5;
    int *b;
    b = &a;
    printf("The address of variable 'a' with value %d:\n %p", a, b);
    // & is used for reference
    // * is for de-referencing
    printf("\n\n\n");
    return 0;
}
```

## 2.2 Output

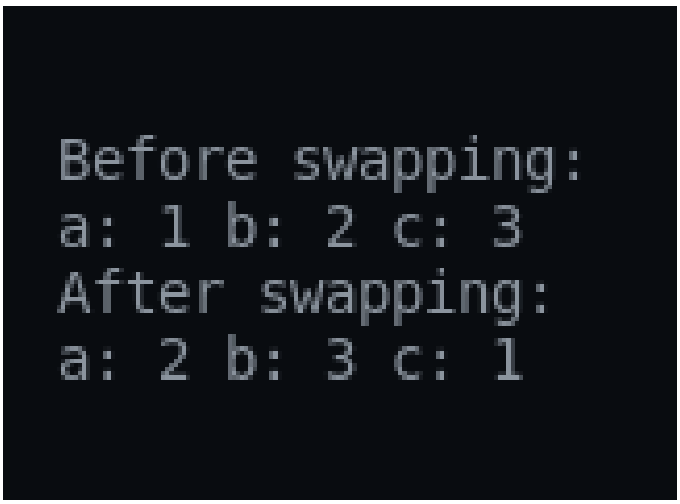
```
The address of variable 'a' with value 5:
 0x7fffd4906b9c
```

# 3

## 3.1 Code

```c
#include <stdio.h>
void swap(int *x, int *y, int *z)
{
    int t;
    t = *x;
    *x = *y;
    *y = *z;
    *z = t;
}
int main()
{
    printf("\n\n\n");
    int a = 1, b = 2, c = 3, t;
    printf("\n Before swapping: ");
    printf("\n a: %d b: %d c: %d", a, b, c);
    swap(&a, &b, &c);
    // call by reference causes changes in actual memory of variables
    printf("\n After swapping: ");
    printf("\n a: %d b: %d c: %d", a, b, c);
    printf("\n\n\n");
    return 0;
}
```

## 3.2 Output

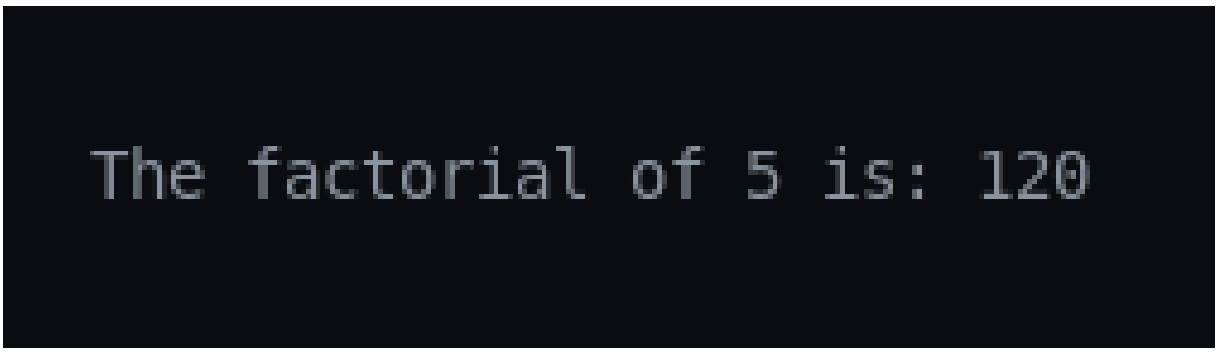


# 4

## 4.1 Code

```c
#include <stdio.h>
int factorial(int *a)
{
    int t = *a - 1;
    if (*a == 1 || *a == 0)
        return 1;   // 0!=1 and 1!=1
    else
        return *a * factorial(&t); // n! = n*(n-1)!
}
int main()
{
    printf("\n\n\n");
    int n = 5;
    printf("The factorial of %d is: %d", n, factorial(&n));
    printf("\n\n\n");
    return 0;
}
```

## 4.2 Output

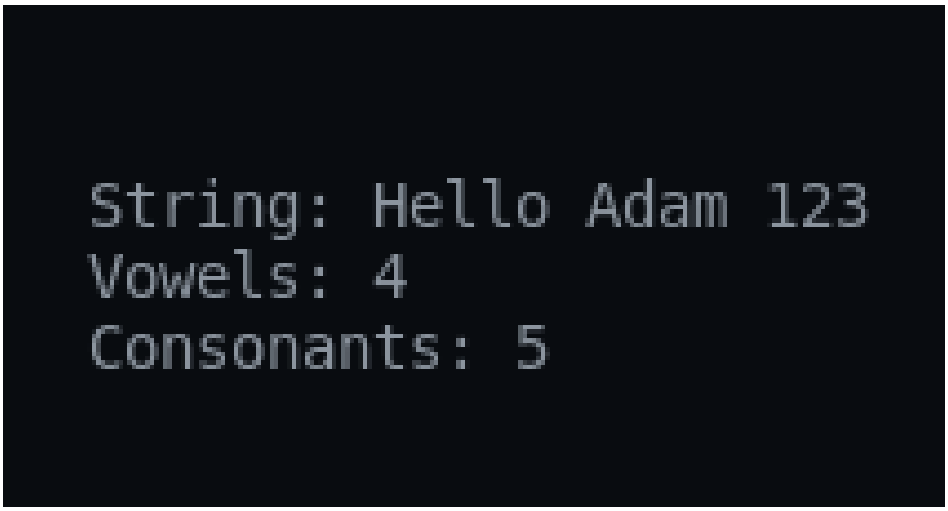


# 5

## 5.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Hello Adam 123";
    int vowels = 0, consonants = 0;
    char *s = str;
    for (int i = 0; s[i] != '\0';)
    {
        if (
            (*s == 'A' || *s == 'E' || *s == 'I' || *s == 'O' || *s == 'U') ||
            (*s == 'a' || *s == 'e' || *s == 'i' || *s == 'o' || *s == 'u'))
            ++vowels;      // if s[i] is vowel
        else if (
            ((*s >= 'A' && *s <= 'Z') || (*s >= 'a' && *s <= 'z')) &&
            (!(
                (*s == 'A' || *s == 'E' || *s == 'I' || *s == 'O' || *s == 'U') ||
                (*s == 'a' || *s == 'e' || *s == 'i' || *s == 'o' || *s == 'u'))))
            ++consonants;   // if s[i] is alphabet but not vowel
        *s++;
    }
    printf("\n String: %s", str);
    printf("\n Vowels: %d \n Consonants: %d", vowels, consonants);
    printf("\n\n\n");
    return 0;
}
```

## 5.2 Output



# 6

## 6.1 Code

```c
#include <stdio.h>
void swap(int *a, int *b)
{
    int t;
    t = *a;
    *a = *b;
    *b = t;
}
void print_array(int a[], int n)
{
    for (int i = 0; i < n; ++i)
        printf(" %d ", a[i]);
    printf("\n");
}
int main()
{
    printf("\n\n\n");
    int a[] = {3, 2, 6, 4, 7, 1, 3, 6, 9, 0, 5};
    int n = 11, i, j;
    printf("\n The original array: \n");
    print_array(a, n);
    for (i = 0; i < n; ++i) //selection sorting
    {
        int *b = a;
        for (j = 0; j < n - 1; ++j)
        {
            if (*b > *(b + 1))
                swap(&(*b), &(*(b + 1)));
            *b++;
        }
    }
    printf("\n The ordered array: \n");
    print_array(a, n);
    printf("\n\n\n");
    return 0;
}
```

## 6.2 Output

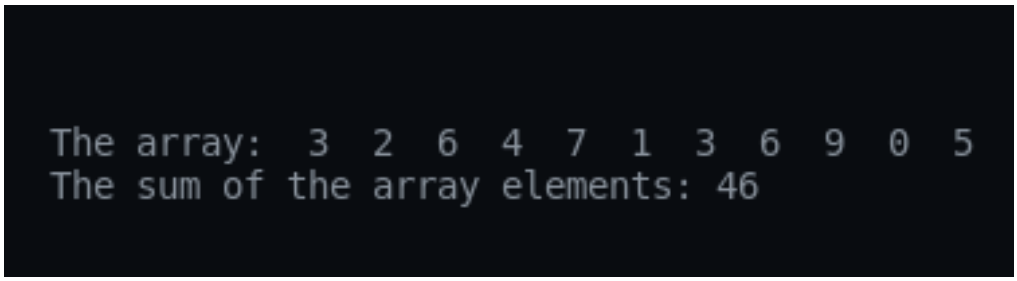
```
The original array:
3  2  6  4  7  1  3  6  9  0  5

The ordered array:
0  1  2  3  3  4  5  6  6  7  9
```

# 7

## 7.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[] = {3, 2, 6, 4, 7, 1, 3, 6, 9, 0, 5};
    int n = 11,i,s=0;
    int *b=a;
    printf("\n The array: ");
    for(i=0;i<n;++i)
    {
        printf(" %d ", *b);
        s+=*b;  // add elemnts to s one by one
        *b++;
    }
    printf("\n The sum of the array elements: %d",s);
    printf("\n\n\n");
    return 0;
}
```

## 7.2 Output

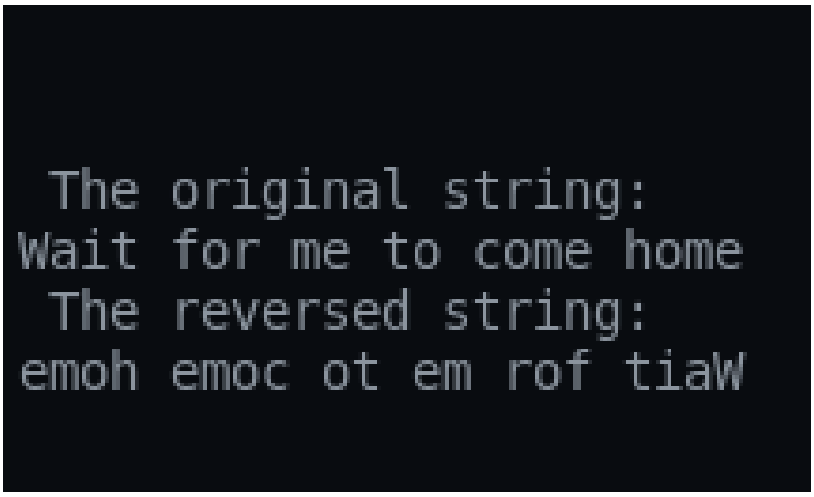


# 8

## 8.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Wait for me to come home";
    char *s = str;
    int length = 0;
    for (length = 0; str[length] != '\0'; ++length);
    printf("\n The original string: \n%s", str);
    printf("\n The reversed string: \n");
    for (int i = length - 1; i >= 0; --i)
        printf("%c", *(s + i)); // printing the string from backwards
    printf("\n\n\n");
    return 0;
}
```

## 8.2 Output

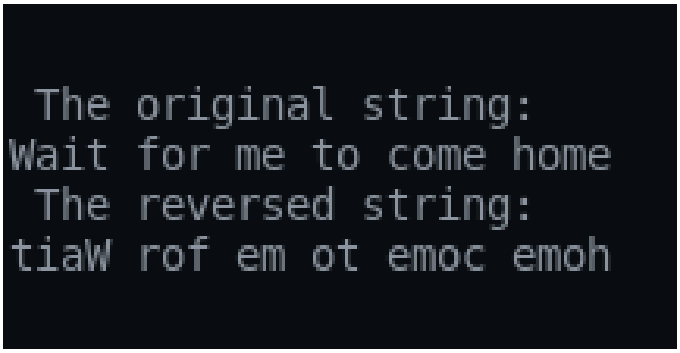


# 9

## 9.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Wait for me to come home";
    char *s = str;
    int length = 0, i, j = 0, k;
    printf("\n The original string: \n%s", str);
    printf("\n The reversed string: \n");
    for (i = 0; str[i] != '\0';)
    {
        for (length = j; str[length] != ' ' && str[length] != '\0'; ++length);
        //length of next word
        if (i == 0)
            i = -1;
        ++i;
        for (int k = length - 1; k >= j && str[i] != '\0'; --k, ++i)
            printf("%c", *(s + k)); //printing the from backwards
        j = length + 1;
        printf(" ");
    }
    printf("\n\n\n");
    return 0;
}
```

## 9.2 Output

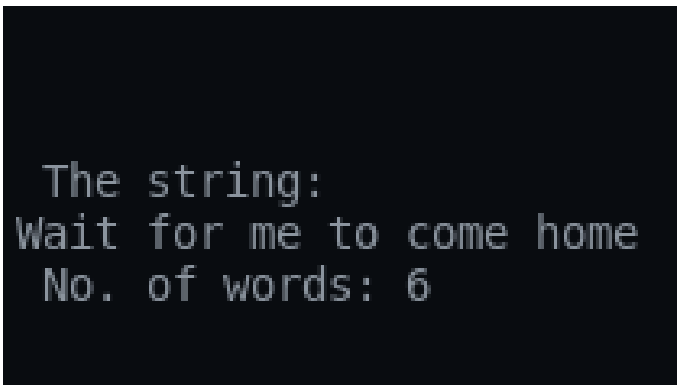


# 10

## 10.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Wait for me to come home";
    int i, j = 0, k = 0;
    printf("\n");
    printf("\n The string: \n%s", str);
    for (i = 0; str[i] != '\0'; ++i)
    {
        if (str[i] == ' ' || str[i + 1] == '\0')
            ++k;    //if a space or null charcater is encountered
    }
    printf("\n No. of words: %d", k);
    printf("\n\n\n");
    return 0;
}
```

## 10.2 Output



# 11

## 11.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str1[] = "Hearing you wispher through the phone";
    char str2[] = "Wait for me to come home";
    char *s1 = str1, *s2 = str2;
    int l1 = 0, l2 = 0, i;
    for (i = 0; *s1 != '\0'; *s1++, l1++);  //length of 1st string
    for (i = 0; *s2 != '\0'; *s2++, l2++);  //length of 2nd string
    printf("\n 1st string: %s",str1);
    printf("\n 2nd string: %s\n ",str2);
    if (l1 > l2)
        printf("String 1st is greater than 2nd");
    else if (l1 < l2)
        printf("String 2nd is greater than 1st");
    else
        printf("Both strings have equal lengths");
    printf("\n\n\n");
    return 0;
}
```

## 11.2 Output

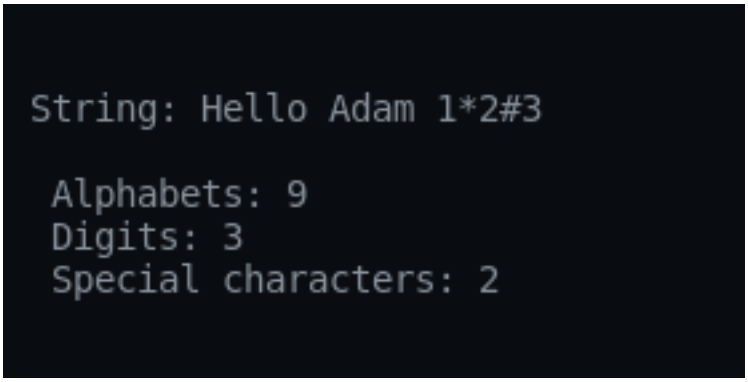
```
1st string: Hearing you wispher through the phone
2nd string: Wait for me to come home
String 1st is greater than 2nd
```

# 12

## 12.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Hello Adam 1*2#3";
    int alphabets = 0, digits = 0, special = 0;
    char *s = str;
    for (int i = 0; s[i] != '\0';)
    {
        if ((*s >= 'A' && *s <= 'Z') || (*s >= 'a' && *s <= 'z'))
            ++alphabets;
        else if (*s >= '0' && *s <= '9')
            ++digits;
        else if (*s != ' ')
            ++special;  //if charcater is not alphabet, number or space
        *s++;
    }
    printf("String: %s\n", str);
    printf("\n Alphabets: %d", alphabets);
    printf("\n Digits: %d", digits);
    printf("\n Special characters: %d", special);
    printf("\n\n\n");
    return 0;
}
```

## 12.2 Output



# 13

## 13.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str1[] = "Hearing you wispher through the phone";
    char str2[100];
    char *s1 = str1, *s2 = str2;
    for (; *s1 != '\0'; *s1++, *s2++)
        *s2 = *s1;  //copying str1 in str2 by every character
    *s2 = '\0';
    printf("\n The 1st string: %s", str1);
    printf("\n The 2nd string: %s", str2);
    printf("\n\n\n");
    return 0;
}
```

## 13.2 Output

```
The 1st string: Hearing you wispher through the phone
The 2nd string: Hearing you wispher through the phone
```

# 14

## 14.1 Code

```
#include <stdio.h>
char mode(char a[], int n)
{
    int i, j, k, l = 0, m = 0;
    for (i = 0; a[i] != '\0'; ++i)
        if (a[i] >= 'A' && a[i] <= 'Z')
            a[i] += 32;     //to convert whole string in lowercase to avoid ambiguity
    for (i = 1, k = 1; i < n; ++i)
    {
        if (a[i] == a[0])
            k++; //no. of times 1st element appears
    }
    m = 0;
    for (i = 0; i < n; ++i)
    {
        l = 1;
        for (j = 0; j < n; ++j)
        {
            if ((a[i] == a[j]) && (i != j) && (a[j] != ' '))
                l++; //no. of times a[j] appears in the array
        }
        if (l > k)
            k = l, m = i; //if a[j] appears more times than a[k], replace a[k]
    }
    return a[m]; //returns mode (if any), if every number occurs once, returns first ele
}
int main()
{
    printf("\n\n\n");
    char str[] = "Hearing you wispher through the phone";
    int length;
    for (length = 0; str[length] != '\0'; ++length);
    printf("The string: %s", str);
    printf("\n The most occuring character: %c", mode(str, length));
    printf("\n\n\n");
    return 0;
}
```

## 14.2 Output

```
The string: Hearing you wispher through the phone
 The most occuring character: h
```

# 15

## 15.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Hearing you wispher through the phone";
    char check[] = "isphe";
    char *s = str, *c = check;
    int lc, i = 0, k = 0;
    for (lc = 0; check[lc] != '\0'; ++lc);
    for (; *s != '\0'; *s++)
    {
        k = 0;
        if (*s == *c)   //if 1st charcter is found
            for (i = 0; i < lc; ++i)
                if (*(s + i) == *(c + i))   //then check for all chcrcaters
                    ++k;
        if (k == lc)
        {
            printf("Substring \" %s \" is present in string\n ( %s )", check, str);
            break;
        }
    }
    printf("\n\n\n");
    return 0;
}
```

## 15.2 Output

```
Substring " isphe " is present in string
 ( Hearing you wispher through the phone )
```

# 16

## 16.1 Code

```c
#include <stdio.h>
#include <string.h>
int main()
{
    printf("\n\n\n");
    char str1[] = "Hearing you wispher through the phone";
    char str2[] = "Wait for me to come home", str3[100] = "Photograph";
    printf("\n The length of 1st string: %ld", strlen(str1));
    strcpy(str3, str1);
    printf("\n 3rd string after copying: %s", str3);
    strcat(str2, str1);
    printf("\n 2nd string after concatenation: %s", str2);
    int t = strcmp(str1, str2);
    printf("\n Strings 1st and 2nd are ");
    if (!t)
        printf("same");
    else
        printf("not same");
    printf("\n\n\n");
    return 0;
}
```

## 16.2 Output

```
The length of 1st string: 37
3rd string after copying: Hearing you wispher through the phone
2nd string after concatenation: Wait for me to come homeHearing you wispher through the phone
Strings 1st and 2nd are not same
```

# 17

## 17.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Wait For Me To Come Home";
    char *s = str;
    printf("\n The original string: %s", str);
    printf("\n The new string: ");
    for (; *s != '\0'; *s++)
    {
        if (*s >= 'a' && *s <= 'z')
            *s = *s - 32;
            //if anycharcter is lowercase, change into uppercase
        printf("%c", *s);
    }
    printf("\n\n\n");
    return 0;
}
```

## 17.2 Output

```
The original string: Wait For Me To Come Home
The new string: WAIT FOR ME TO COME HOME
```

# 18

## 18.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    char str[] = "Wait For Me To Come Home";
    char *s = str;
    int a, b;
    printf("\n The string: %s\n", str);
    printf("\n Starting point: ");
    scanf("%d", &a);    //from which character to trim
    printf("\n Length of subsection: ");
    scanf("%d", &b);    //length of substring
    printf("\n The substring: ");
    for (int i = 0; *s != '\0'; *s++, ++i)
    {
        if (i == a - 1)
            for (; i < a - 1 + b; ++i)
                printf("%c", *s++);
    }
    printf("\n\n\n");
    return 0;
}
```

## 18.2 Output

```
The string: Wait For Me To Come Home

Starting point: 6

Length of subsection: 9

The substring: For Me To
```

# 19

## 19.1 Code

## 19.2 Output

# 20

## 20.1 Code

```c
#include <stdio.h>
int deletion(char a[], char s, int n)
{
    int i, j, pos = -1;
    for (i = 0; i < n; ++i)
    {
        pos = -1;
        if (a[i] == s)
            pos = i;
        if (pos != -1)
        {
            for (j = pos; j < n; ++j)
                a[j] = a[j + 1];    //if anyvowel found replace with next element
            a[j] = 0;
            --n, --i;
        }
    }
    return n;
}
int main()
{
    char str[] = "Wait for me to come home";
    printf("\n The old string: %s", str);
    int n = 0;
    for (n = 0; str[n] != '\0'; ++n);
    for (int i = 0; str[i] != '\0'; ++i)
    {
        if (
            (str[i] == 'A' || str[i] == 'E' || str[i] == 'I' || str[i] == 'O' ||
            str[i] == 'U') ||(str[i] == 'a' || str[i] == 'e' || str[i] == 'i' ||
            str[i] == 'o' || str[i] == 'u'))
            n = deletion(str, str[i], n), --i;  //remove any vowel
    }
    printf("\n The new string: %s", str);
    return 0;
}
```

## 20.2 Output

```
The old string: Wait for me to come home
The new string: Wt fr m t cm hm
```