# Lab Assignment 5b

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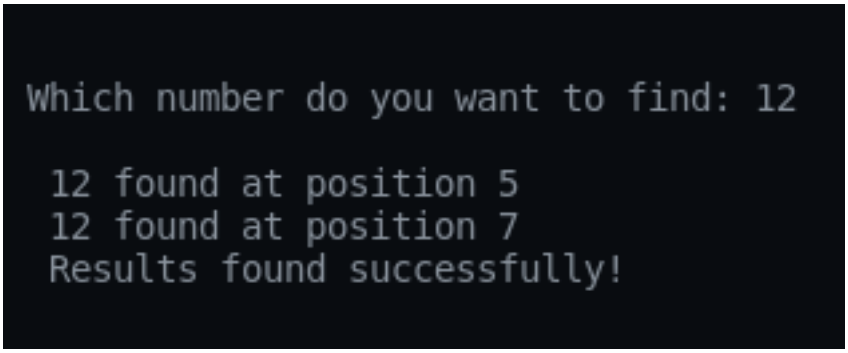
**Contents**

# 1

## 1.1 Code

```c
#include <stdio.h>
int linear_search(int a[], int n)
{
    int i, k = 0;
    for (i = 0; i < 10; ++i)
    {
        if (a[i] == n)  //compares the given number with every element of array
        {
            k = 1;  //true if element found
            printf("\n %d found at position %d", n, i);
        }
    }
    return k;
}
int main()
{
    printf("\n\n\n");
    int n, a[10] = {2, 5, 17, 45, 23, 12, 78, 12, 16, 23};
    printf("Which number do you want to find: ");
    scanf("%d", &n);    //input the number to be searched in the array
    if (linear_search(a, n))    //if function return true
        printf("\n Results found successfully!");
    else    //if function return false
        printf("\n No results found for %d in array.", n);
    printf("\n\n\n");
    return 0;
}
```

## 1.2 Output



# 2

## 2.1 Code

```c
#include <stdio.h>
#include <stdlib.h>
int main()
{
    printf("\n\n\n");
    int r, i;
    char a[2][36000];
    for (i = 0; i < 36000; i++)
    {
        r = (rand() % 2);   //assign 0 or 1 on random to r
        if (r)
        {
            a[0][i] = 'H';
            a[1][i] = 'T';
        }
        else
        {
            a[0][i] = 'T';
            a[1][i] = 'H';
        }
        printf("%c %c", a[0][i], a[1][i]);  //print the result of 1 toss of both dice
        printf("\t");
    }
    printf("\n\n\n");
    return 0;
}
```

## 2.2 Output

```
T H    H T    H T    T H    T H    T H    T H    H T    H T    H T    T H    T H    H T    H T    T H    H T    H T    H T
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```

# 3

## 3.1 Code

```
#include <stdio.h>
#include <stdlib.h>
float mean(int a[], int n)
{
    int s = 0, i;
    for (i = 0; i < n; ++i)
        s += a[i];            //sum all the numbers in the array
    return (((float)s) / n); //return sum/n;
}
int main()
{
    printf("\n\n\n");
    int i, j;
    int Grades[5][20]; //3a
    printf("\na) Array is initialized as Grades[5][20]");

    printf("\nb) There are %d rows in the array.", 5); //3b

    printf("\nc) There are %d columns in the array.", 20); //3c

    printf("\nd) There are %d elements in the array.", 5 * 20); //3d

    printf("\ne) Names of all elements in the first column of array: ");
    for (i = 0; i < 5; ++i)
        printf("%dx0, ", i); //3e

    printf("\nf) Name of the element in the third row and second column of the array: %dx%

    Grades[0][1] = 100; //3g
    printf("\ng) Element in the first row and second column: %d", Grades[0][1]);

    double mathGrades[20];
    for (i = 0; i < 20; ++i)
        mathGrades[i] = (rand() % 9) + 1; //assign random grades to mathGrades from 1-9

    printf("\n\nh) Enter the elements of array Grades: \n");
    for (i = 0; i < 5; ++i)
    {
        printf("Row %d: \n", i + 1);
        for (j = 0; j < 20; ++j)
            scanf("%d", &Grades[i][j]); //3h
    }

    printf("\ni) The array after initialization with 0: \n");
    for (i = 0; i < 5; ++i)
    {
```

```
    for (j = 0; j < 20; ++j)
    {
        Grades[i][j] = 0; //3i
        printf("%d ", Grades[i][j]);
    }
    printf("\n");
}

printf("\nj) First rwo of Grades after copying from mathGrades: \n");
for (i = 0; i < 20; ++i)
{
    Grades[0][i] = mathGrades[i]; //3j
    printf("%d ", Grades[0][i]);
}

printf("\n\nk) The greatest number in the first row is: ");
int big = Grades[0][0];
for (i = 0; i < 20; ++i)
    if (Grades[0][i] > big)
        big = Grades[0][i];
printf("%d", big);

printf("\n\nl) Elements of column 2 of array: ");
for (i = 0; i < 5; ++i)
    printf("%d ", Grades[i][1]);

printf("\n\nm) The average of the elements in the first row: %f", mean(Grades[0], 20))

printf("\n\nn) The final array in tabular form: \n");
for (i = -1; i < 5; ++i)
{
    for (j = -1; j < 20; ++j)
    {
        if (i == -1)
        {
            if (j == -1)
                printf("    ");
            else
                printf("  %c ", j + 65);
        }
        else
        {
            if (j == -1)
                printf("%d)  ", i + 1);
            else
                printf("  %d ", Grades[i][j]);
        }
    }
    printf("\n");
}
```

```
    printf("\n\n\n");
    return 0;
}
```

## 3.2 Output

```
a) Array is initialized as Grades[5][20]
b) There are 5 rows in the array.
c) There are 20 columns in the array.
d) There are 100 elements in the array.
e) Names of all elements in the first column of array: 0x0, 1x0, 2x0, 3x0, 4x0,
f) Name of the element in the third row and second column of the array: 2x1
g) Element in the first row and second column: 100

h) Enter the elements of array Grades:
Row 1:
1 4 2 3 2 6 4 8 6 8 5 7 3 6 9 4 7 6 3 7
Row 2:
5 2 6 3 7 5 8 9 4 3 6 7 2 6 4 6 8 5 7 5
Row 3:
4 6 7 3 6 3 1 5 7 3 6 8 4 8 6 4 3 1 5 8
Row 4:
4 7 4 2 4 2 8 5 7 4 2 6 1 6 3 8 5 3 9 6
Row 5:
9 6 9 6 9 0 5 3 7 5 7 5 3 1 4 5 8 0 6 4

i) The array after initialization with 0:
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

j) First rwo of Grades after copying from mathGrades:
2 8 1 8 6 8 2 4 7 2 6 5 6 8 6 5 7 1 8 2

k) The greatest number in the first row is: 8

l) Elements of column 2 of array: 8 0 0 0 0

m) The average of the elements in the first row: 5.100000

n) The final array in tabular form:
      A   B   C   D   E   F   G   H   I   J   K   L   M   N   O   P   Q   R   S   T
1)    2   8   1   8   6   8   2   4   7   2   6   5   6   8   6   5   7   1   8   2
2)    0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
3)    0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
4)    0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
5)    0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
```

# 4

## 4.1 Code

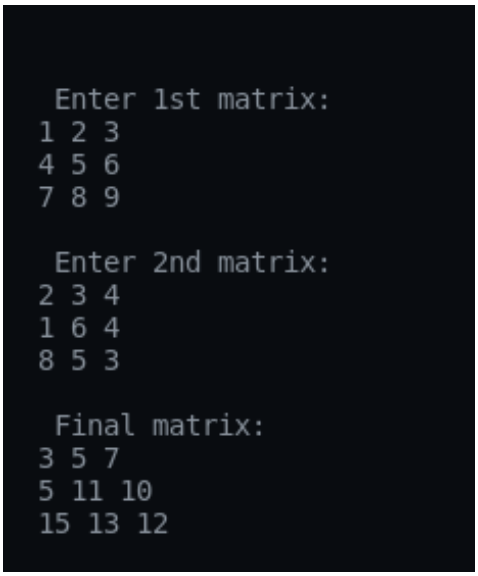
```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[3][3], b[3][3], i, j;

    printf("\n Enter 1st matrix: \n");
    for (i = 0; i < 3; ++i)
        for (j = 0; j < 3; ++j)
            scanf("%d", &a[i][j]);  //input 1st matrix element-wise

    printf("\n Enter 2nd matrix: \n");
    for (i = 0; i < 3; ++i)
        for (j = 0; j < 3; ++j)
            scanf("%d", &b[i][j]);  //input 2nd matrix element-wise

    printf("\n Final matrix: \n");
    for (i = 0; i < 3; ++i)
    {
        for (j = 0; j < 3; ++j)
            printf("%d ", a[i][j] + b[i][j]);   //print the addition of both matrices
        printf("\n");
    }
    printf("\n\n\n");
    return 0;
}
```

## 4.2 Output



# 5

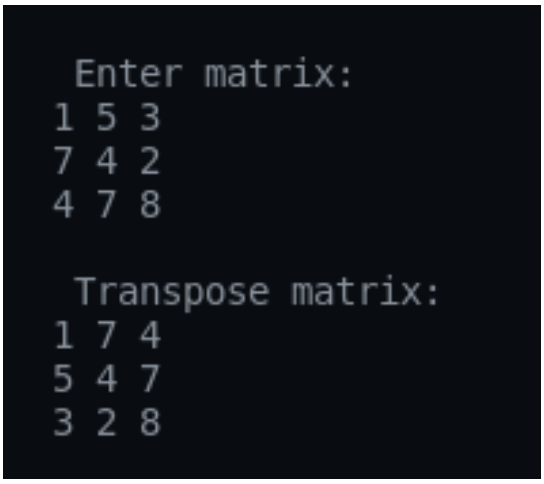
## 5.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[3][3], i, j;

    printf("\n Enter matrix: \n");
    for (i = 0; i < 3; ++i)
        for (j = 0; j < 3; ++j)
            scanf("%d", &a[i][j]);  //input matrix element-wise

    printf("\n Transpose matrix: \n");
    for (i = 0; i < 3; ++i)
    {
        for (j = 0; j < 3; ++j)
            printf("%d ", a[j][i]); //print by transposing every element
        printf("\n");
    }
    printf("\n\n\n");
    return 0;
}
```

## 5.2 Output



# 6

## 6.1 Code

```
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[10][10], b[10][10], c[10][10], i, j, k, m, n, o, p;

    printf("\n Enter the order of 1st matrix: ");
    scanf("%d%d", &m, &n);
    printf("\n Enter 1st matrix: \n");
    for (i = 0; i < m; ++i)
        for (j = 0; j < n; ++j)
            scanf("%d", &a[i][j]);  //input 1st matrix element-wise

    printf("\n Enter the order of 2nd matrix: ");
    scanf("%d%d", &o, &p);
    printf("\n Enter 2nd matrix: \n");
    for (i = 0; i < o; ++i)
        for (j = 0; j < p; ++j)
            scanf("%d", &b[i][j]);  //input 2nd matrix element-wise

    if (n != o)
        printf("\n Matrix multiplication not possible.");   //if no. of columns of 1st ma
    else
    {
        printf("\n Final matrix: \n");
        for (i = 0; i < m; ++i)
        {
            for (j = 0; j < p; ++j)
            {
                c[i][j] = 0;
                for (k = 0; k < n; ++k)
                    c[i][j] += a[i][k] * b[k][j];   //multiplying row of first matrix to
                printf("%d ", c[i][j]);
            }
            printf("\n");
        }
    }
    printf("\n\n\n");
    return 0;
}
```

## 6.2 Output

```
 Enter the order of 1st matrix: 2 3

 Enter 1st matrix:
1 4 2
2 5 1

 Enter the order of 2nd matrix: 3 2

 Enter 2nd matrix:
2 5
3 5
2 1

 Final matrix:
18 27
21 36
```

# 7

## 7.1 Code

```c
#include <stdio.h>
int main()
{
    printf("\n\n\n");
    int a[3][3], i, j;
    printf("\n Required matrix: \n");
    for (i = 0; i < 3; ++i)
    {
        for (j = 0; j < 3; ++j)
        {
            if(i>j)a[i][j]=-1;  //for lower diagnol triangle
            else if(i<j)a[i][j]=1;  //for upper diagnol triangle
            else a[i][j]=0; //for principle diagnol

            printf("%d ", a[i][j]);
        }
        printf("\n");
    }
    printf("\n\n\n");
    return 0;
}
```

## 7.2 Output