Week 1C programming questions

Q. 1 Write a program to accept height and base of triangle and calculate area of Triangle

Note: area =(h*b)/2

```
#include<stdio.h>
intmain()
{
    inth,b,area;
    printf("Enter the hieght:");
    scanf("%d",&h);
    printf("Enter the base:");
    scanf("%d",&b);
    area=(h*b)/2;
    printf("Area of
triangle:%d",area);
    return0;
}
```

Q. 2 Write a program to accept radius of circle and calculate area of circle

Note: area =pi * r2

```
#include<stdio.h>
intmain()
{
    intr,area;
    printf("Enter the radius of
circle:");
    scanf("%d",&r);
    area=3.14*r*r;
    printf("Area of circle:%d",area);
    return0;
}
```

Q. 3 Write a program to find the lowest marks of three students using conditional operator.

```
#include<stdio.h>
voidmain() {
    inta, b, c;
    printf("Enter the marks of three students: ");
    scanf("%d%d%d", &a, &b, &c);
    (a<b) ? ((a<c) ?printf("Lowest marks: %d", a) :printf("Lowest marks: %d", c)) : ((b<c) ?printf("Lowest marks: %d", b) :printf("Lowest marks: %d", c));
}
```

Q. 4 Write a program to Calculate Compound Interest.

```
# include<stdio.h>
# include<math.h>
intmain()
{
    floatp,t,r,amt,ci;
    printf("Enter the principal
amount:");
    scanf("%f",&p);
    printf("Enter the annual rate:");
    scanf("%f",&r);
    printf("Enter the annual time:");
    scanf("%f",&t);
    amt=p*pow((1+r/100),t);
    printf("amount is %.2f",amt);
    ci=amt-p;
    printf("\ncompound interest is
%.2f",ci);
    return0;
}
```

Q. 5 Write a program to Calculate Cube of a Number.

```
# include<stdio.h>
# include<math.h>
intmain()
{
    intn,cube;
    printf("enter the number:");
    scanf("%d",&n);
    cube=pow(n,3);
    printf("Cube of given number is
%d",cube);
    return0;
}
```

Week – 2 Programming Questions

Q. 1 Write a program to interchange two values by using Assignment Operator.

```
#include<stdio.h>
intmain()
{
    inta,b,temp=0;
    printf ("enter the value of a:");
    scanf("%d",&a);
    printf("enter the value of b:");
    scanf("%d",&b);
    temp=a;
    a=b;
    b=temp;
    printf("value of a after swaping:%d",a);
    printf("\nvalue of b after swaping:%d",b);
    return0;
}
```

Q. 2 Write a program to interchange two values by using Arithmetic Operator.

```
# include<stdio.h>
intmain()
```

```
{
    inta,b;
    printf("enter the value for a:");
    scanf("%d",&a);
    printf("enter the value for b:");
    scanf("%d",&b);
    a=a+b;
    b=a-b;
    a=a-b;
    printf("after swaping value of
a:%d",a);
    printf("\nafterswaping value of
b:%d",b);
    return0;
}
```

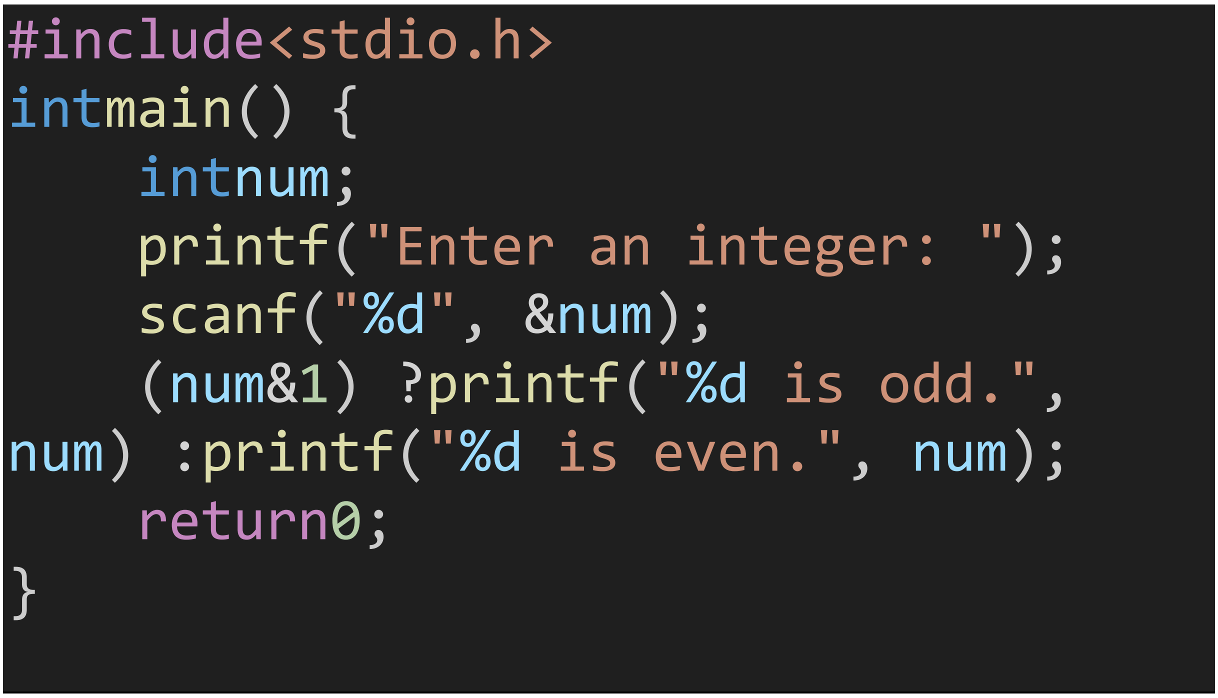
Q. 3 Write a program to interchange two values by using Bitwise Operator.

```
# include<stdio.h>
intmain()
{
    inta,b;
    printf ("enter the value of a:");
    scanf("%d",&a);
    printf("enter the value of b:");
    scanf("%d",&b);
    a=a^b;
    b=a^b;
    a=b^a;
    printf("value of a after 
swapping:%d",a);
    printf("\nvalue of b after 
swapping:%d",b);
    return0;
}
```

Q. 4 Write a program to find the size of all data types (Int, Float, Char, Double, Long Double, Short Int etc.).

```
# include<stdio.h>
intmain()
{
    printf("the size of 
int:%lu",sizeof(int));
    printf("\nthe size of 
float:%lu",sizeof(float));
    printf("\nthe size of 
char:%lu",sizeof(char));
    printf("\nthe size of 
double:%lu",sizeof(double));
    printf("\nthe size of long 
double:%lu",sizeof(longdouble));
    printf("\nthe size of short 
int:%lu",sizeof(shortint));
    return0;
}
```

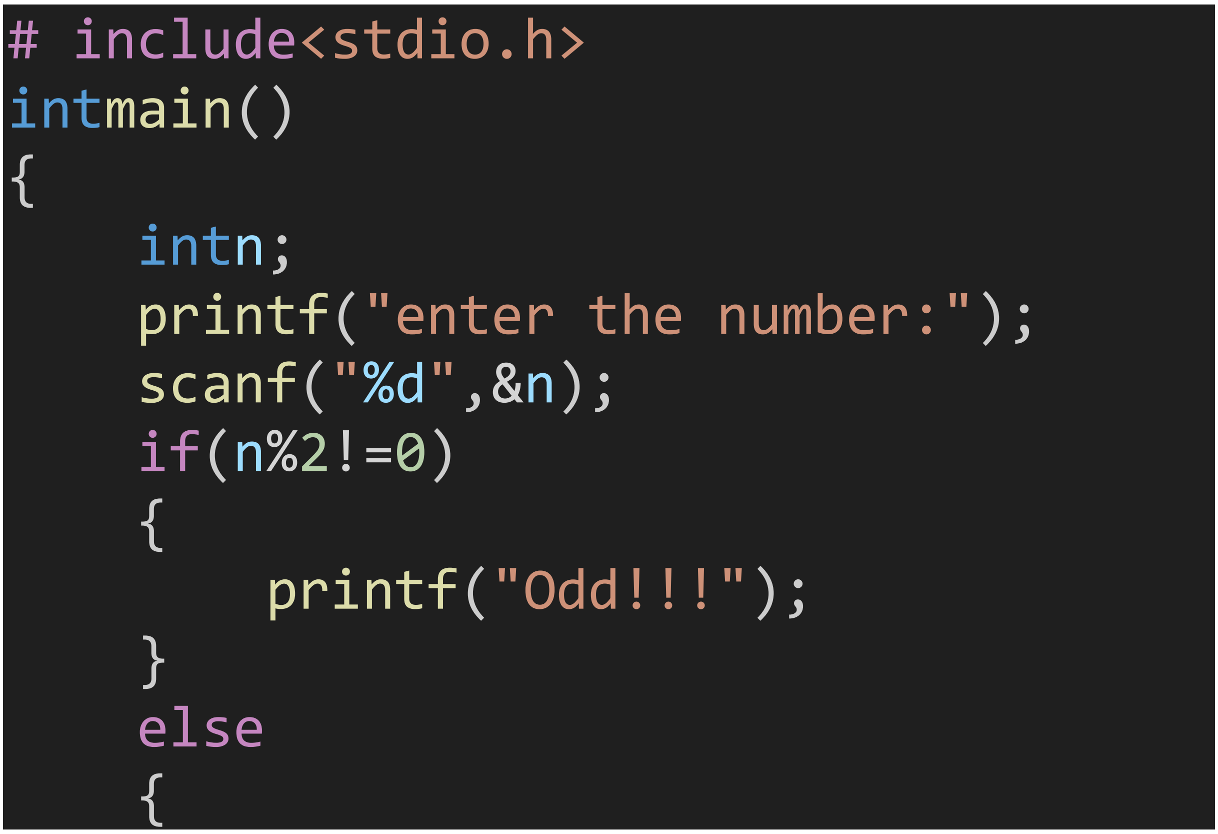
Q. 5 Write a program to find out whether input number is even or odd without using arithmetic operators.



```
#include<stdio.h>
intmain() {
    intnum;
    printf("Enter an integer: ");
    scanf("%d", &num);
    (num&1) ?printf("%d is odd.",
num) :printf("%d is even.", num);
    return0;
}
```

Week – 3 Programming Questions

Q. 1 Write a C program to check whether a given number is even or odd.



```
# include<stdio.h>
intmain()
{
    intn;
    printf("enter the number:");
    scanf("%d",&n);
    if(n%2!=0)
    {
        printf("Odd!!!");
    }
    else
    {
        printf("Even!!!");
    }
}
```

Q. 2 Write a C program to check whether a given number is positive or negative.

```
# include<stdio.h>
intmain()
{
    intn;
    printf("enter the number:");
    scanf("%d",&n);
    if(n>0)
    {
        printf("positive!!!");
    }
    elseif(n<0)
    {
        printf("negative!!!");
    }
    else{
        printf("zero");
    }
}
```

Q. 3 Write a C program to find whether a given year is a leap year or not.

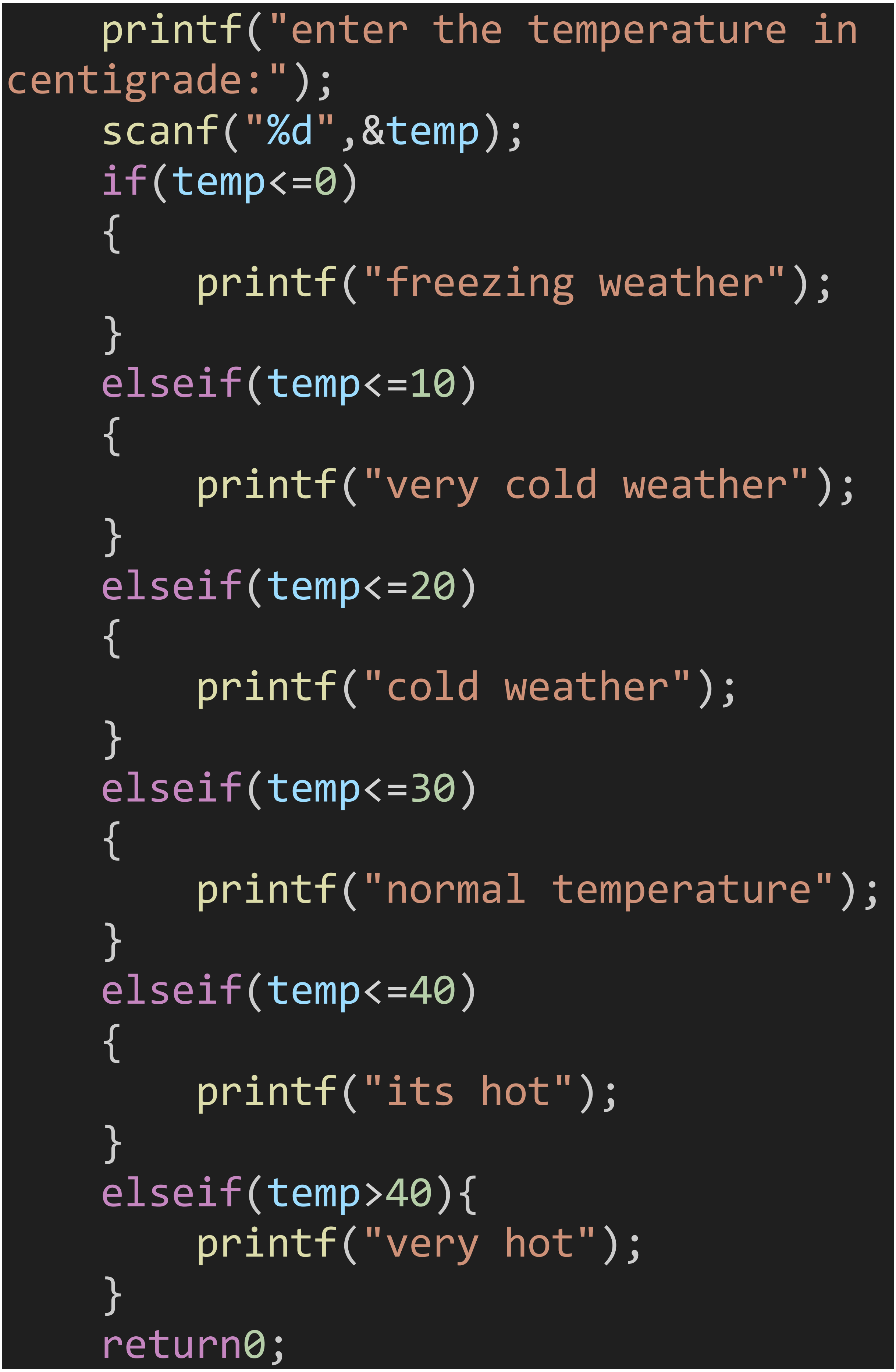
```
# include<stdio.h>
intmain()
{
    intn;
    printf("enter the year:");
    scanf("%d",&n);
    if(n%4!=0)
    {
        printf("not a leap year!!!");
    }
    else
    {
        printf("leap year!!!");
    }
    return0;
}
```

Q. 4 Write a C program to find the largest of three numbers.

```
#include<stdio.h>
intmain()
{
    intm1,m2,m3;
    printf("enter the first
number:");
    scanf("%d",&m1);
    printf("enter the second
number:");
    scanf("%d",&m2);
    printf("enter the third
number:");
    scanf("%d",&m3);
    if(m1>m2&&m1>m3)
    {
        printf("first number is the 
largest no.");
    }
    elseif(m2>m1&&m2>m3)
    {
        printf("second number is the 
largest no.");
    }
    else
    {
        printf("third number is the 
largest no.");
    }
    return0;
}
```

Q. 5 Write a C program to read temperature in centigrade and display a suitable message according to the temperature state below: a. Temp < 0 then Freezing weather b. Temp 0-10 then Very Cold weather c. Temp 10-20 then Cold weather d. Temp 20-30 then Normal in Temp e. Temp 30-40 then Its Hot f. Temp >=40 then Its Very Hot

```
# include<stdio.h>
intmain()
{
    inttemp;
```



```
    printf("enter the temperature in
centigrade:");
    scanf("%d",&temp);
    if(temp<=0)
    {
        printf("freezing weather");
    }
    elseif(temp<=10)
    {
        printf("very cold weather");
    }
    elseif(temp<=20)
    {
        printf("cold weather");
    }
    elseif(temp<=30)
    {
        printf("normal temperature");
    }
    elseif(temp<=40)
    {
        printf("its hot");
    }
    elseif(temp>40){
        printf("very hot");
    }
    return0;
```

```
}
```

Q. 6 Write a C program to read any digit and display it in the word.

```
# include<stdio.h>
intmain()
{
    intn;
    printf("enter the digit to be 
displayed:");
    scanf("%d",&n);
    switch (n)
    {
    case0: printf("Zero");
    break;
    case1: printf("one");
    break;
    case2: printf("Two");
    break;
    case3: printf("Three");
    break;
    case4:printf("Four");
    break;
    case5:printf("Five");
    break;
    case6:printf("Six");
    break;
    case7:printf("Seven");
    break;
    case8:printf("Eight");
    break;
    case9:printf("nine");
    break;
    default:printf("nit a digit");
    break;
    }
}
```

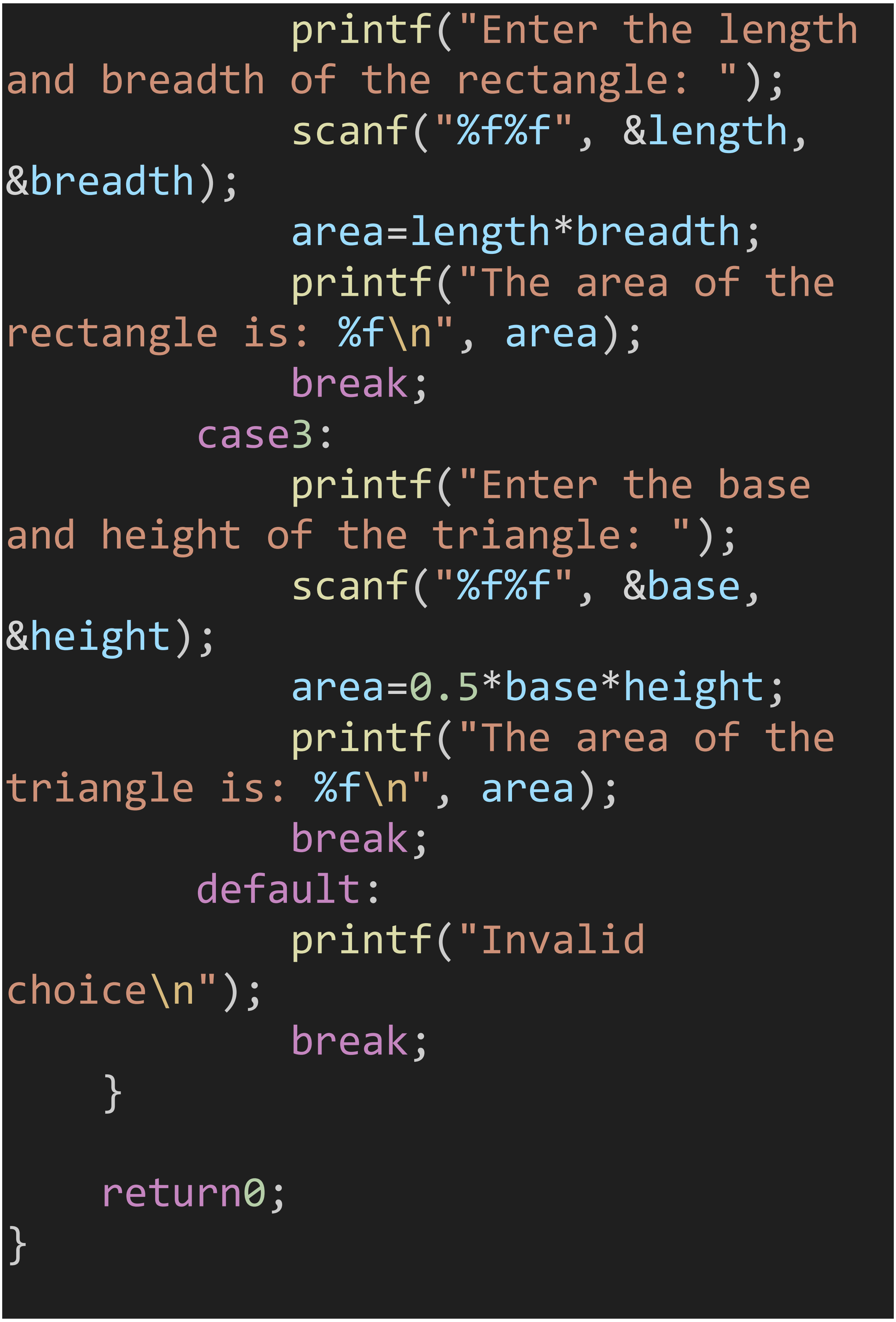
Q. 7 Write a C program to create a Simple Calculator using a switch case.

```
#include<stdio.h>

intmain() {
    charoperator;
    doublefirst, second;

    printf("Enter an operator (+, -,
*, /): ");
    scanf("%c", &operator);

    printf("Enter two operands: ");
    scanf("%lf%lf", &first, &second);

    switch (operator) {
        case'+':
            printf("%.1lf + %.1lf =
%.1lf", first, second, first+second);
```

```
            break;
        case'-':
            printf("%.1lf - %.1lf = 
%.1lf", first, second, first-second);
            break;
        case'*':
            printf("%.1lf * %.1lf = 
%.1lf", first, second, first*second);
            break;
        case'/':
            printf("%.1lf / %.1lf = 
%.1lf", first, second, first/second);
            break;
        default:
            printf("Error! operator 
is not correct");
    }

    return0;
}
```

Q. 8 Write a C program using C Switch…Case to Calculate the Area of Rectangle/ Circle/ Triangle

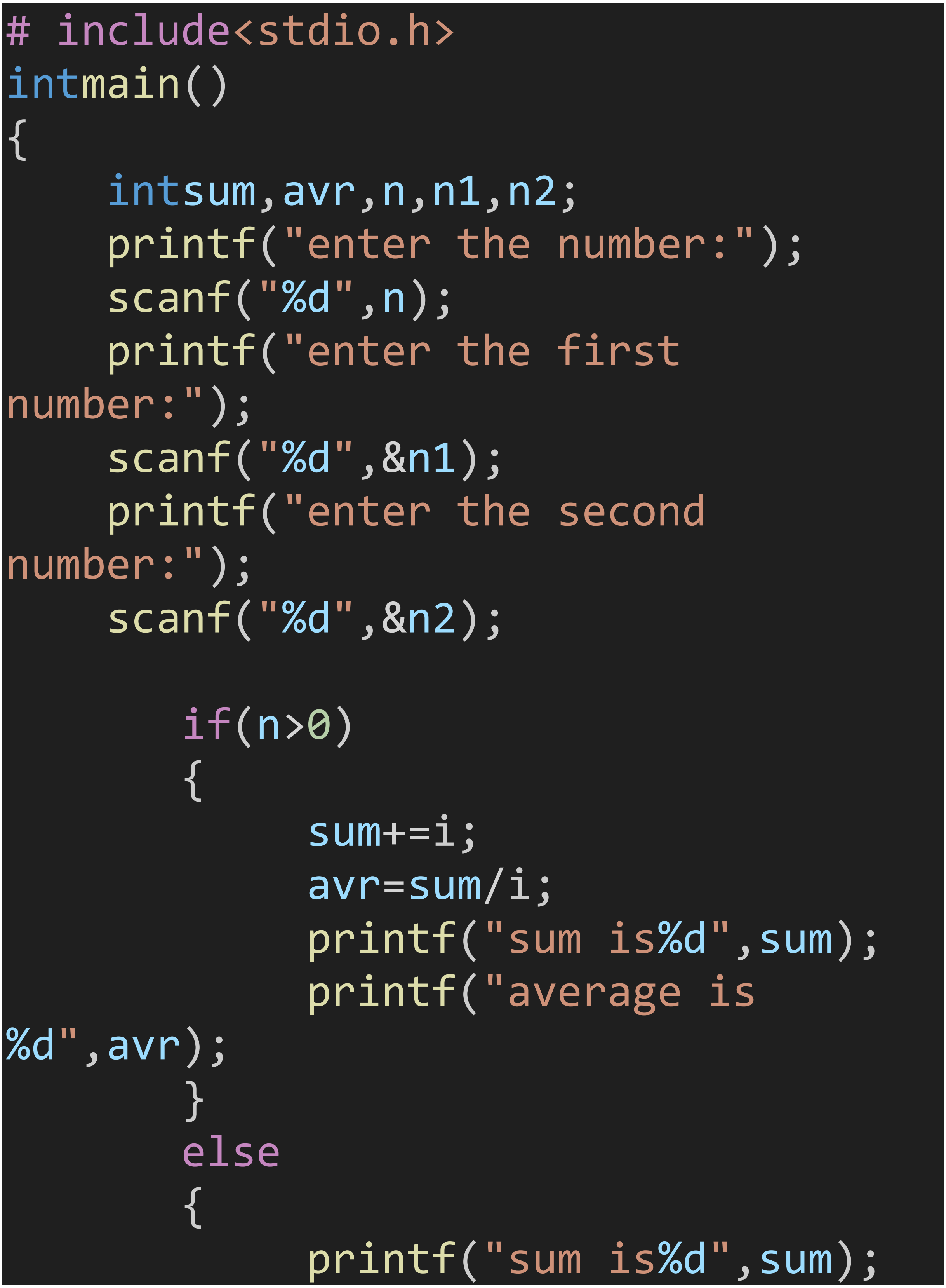
```
#include<stdio.h>

intmain() {
    intchoice;
    floatbase, height, radius,
length, breadth, area;

    printf("Switch Case in C Program
to Calculate Area of
Rectangle/Circle/Triangle\n");
    printf("1. Calculate the area of
a circle\n");
    printf("2. Calculate the area of
a rectangle\n");
    printf("3. Calculate the area of
a triangle\n");
    printf("Enter your choice (1, 2,
or 3): ");
    scanf("%d", &choice);

    switch (choice) {
        case1:
            printf("Enter the radius
of the circle: ");
            scanf("%f", &radius);

area=3.14159*radius*radius;
            printf("The area of the
circle is: %f\n", area);
            break;
        case2:
```



```
            printf("Enter the length
and breadth of the rectangle: ");
            scanf("%f%f", &length,
&breadth);
            area=length*breadth;
            printf("The area of the
rectangle is: %f\n", area);
            break;
        case3:
            printf("Enter the base
and height of the triangle: ");
            scanf("%f%f", &base,
&height);
            area=0.5*base*height;
            printf("The area of the
triangle is: %f\n", area);
            break;
        default:
            printf("Invalid
choice\n");
            break;
    }

    return0;
}
```

H.O.T.S Questions

Q. 9 Write a C program to calculate the sum and average of positive numbers. If the user enters a negative number, the sum and average are displayed.



```
# include<stdio.h>
intmain()
{
    intsum,avr,n,n1,n2;
    printf("enter the number:");
    scanf("%d",n);
    printf("enter the first
number:");
    scanf("%d",&n1);
    printf("enter the second
number:");
    scanf("%d",&n2);

       if(n>0)
       {
            sum+=i;
            avr=sum/i;
            printf("sum is%d",sum);
            printf("average is
%d",avr);
       }
       else
       {
            printf("sum is%d",sum);
            printf("average is
%d",avr);
       }

    return0;

}
```

Q. 10 Write a C program to design a digital clock.

```
#include<stdio.h>
#include<time.h>
intmain() {
    while (1) {
        time_tcurrentTime=time(NULL);

structtm*tm=localtime(&currentTime);
        printf("%02d:%02d:%02d\n",
tm->tm_hour, tm->tm_min, tm->tm_sec);
        sleep(1);
    }
 return0;
}
```

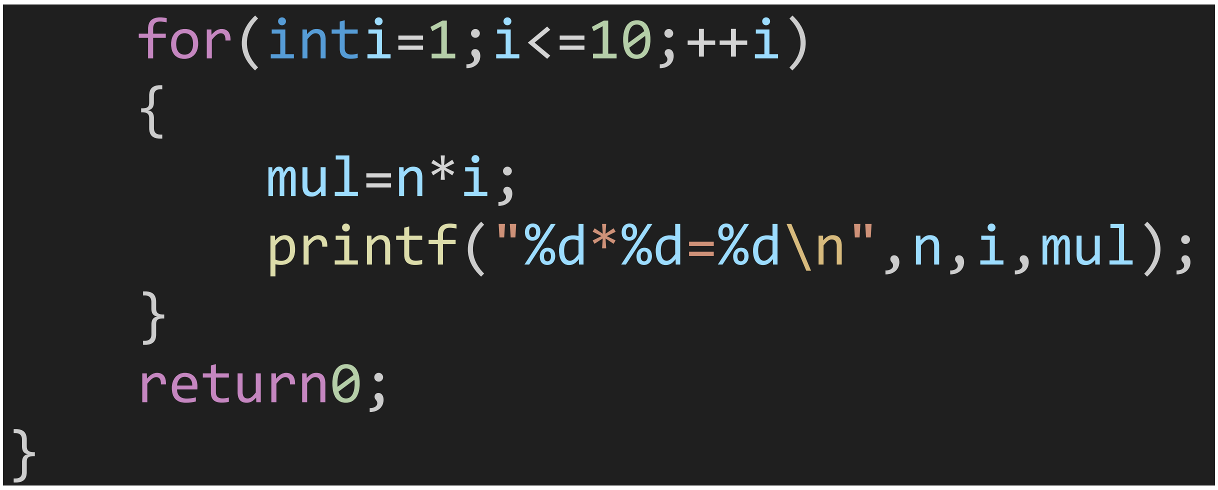
Q. 11 Write a C program to find the sum of digits of a number until a single digit is occurred

```
#include<stdio.h>

intmain() {
    intnumber, sum;
    printf("Enter a number: ");
    scanf("%d", &number);
    while (number>9) {
        sum=0;
        while (number!=0) {
            sum+=number%10;
            number/=10;
        }
        number=sum;
    }
    printf("The sum of digits until a
single digit is occurred: %d\n",
number);
    return0;
}
```

Week – 4 Programming Questions

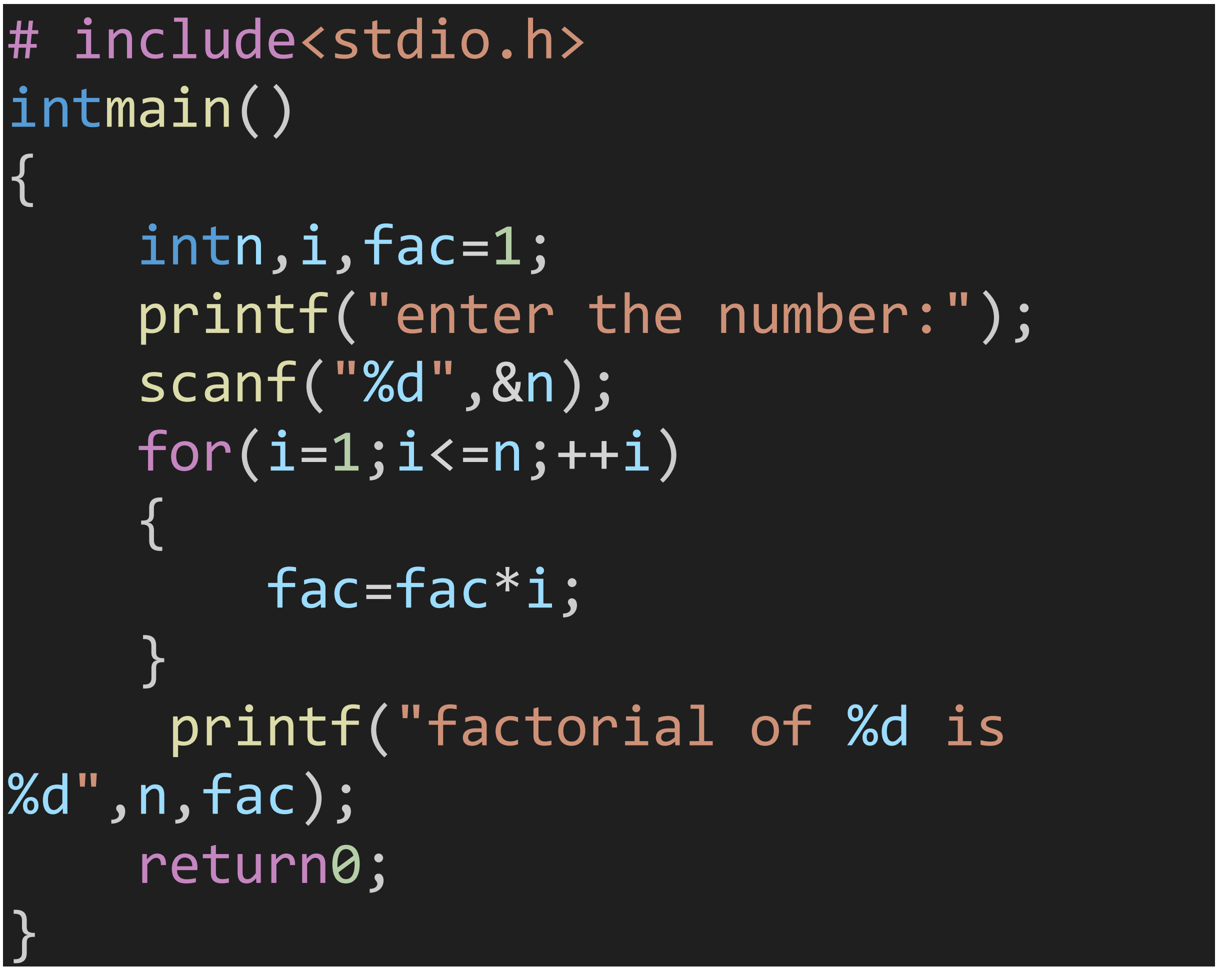
Q. 1 Write a C program to print multiplication table of a number.

```
# include<stdio.h>
intmain()
{
    intn,mul;
    printf("enter the number:");
    scanf("%d",&n);
```



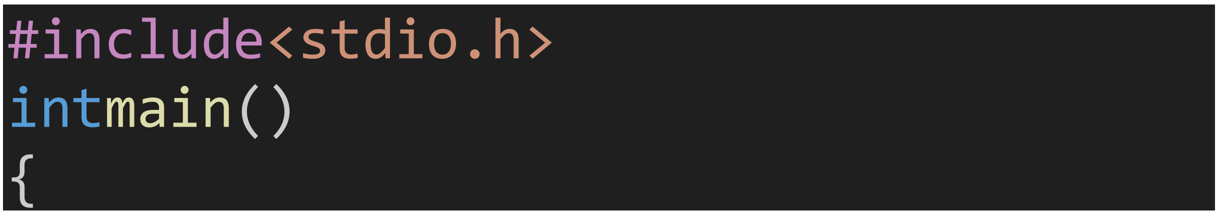
```
    for(inti=1;i<=10;++i)
    {
        mul=n*i;
        printf("%d*%d=%d\n",n,i,mul);
    }
    return0;
}
```

Q. 2 Write a C program to calculate factorial of a number

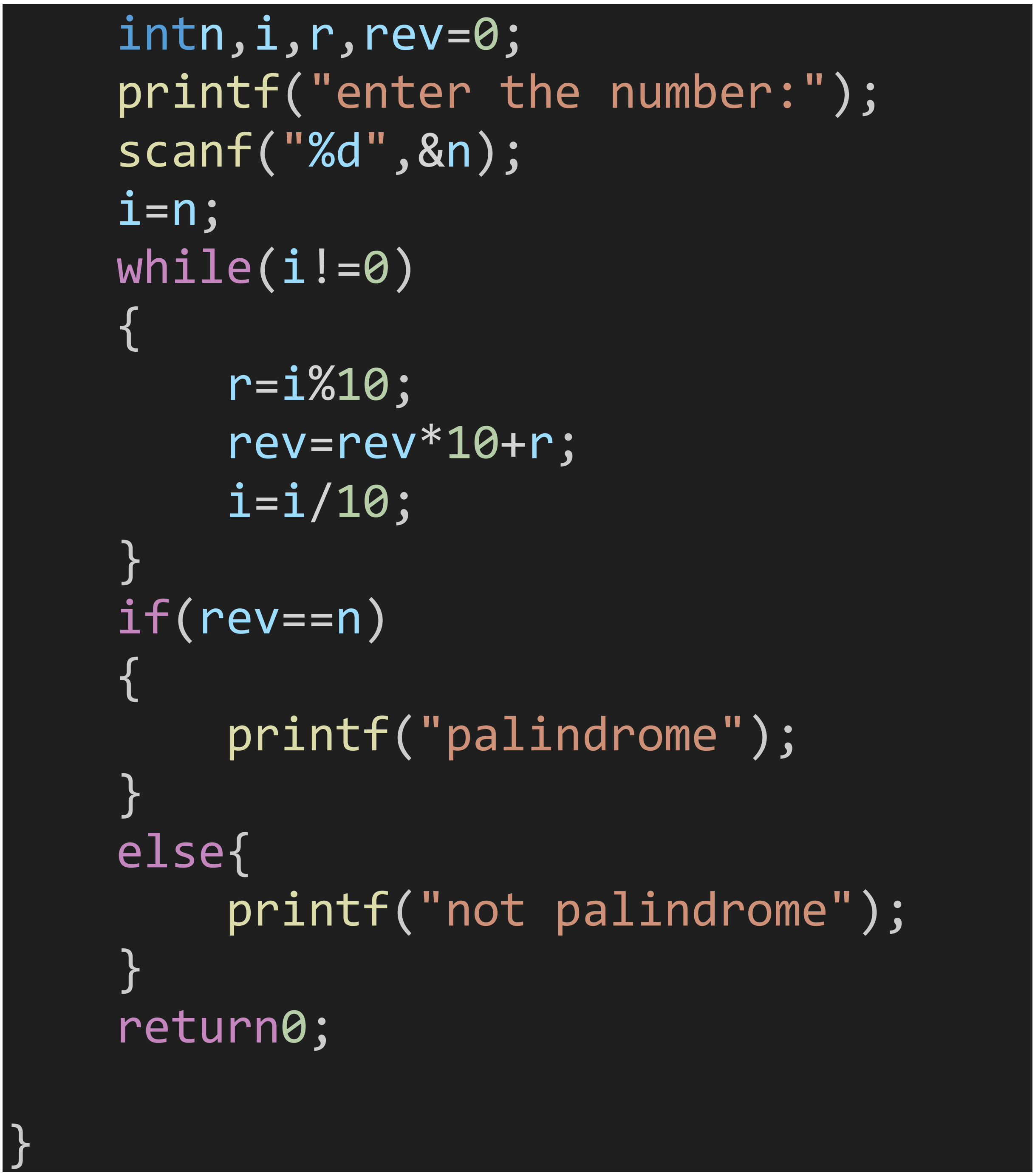


```
# include<stdio.h>
intmain()
{
    intn,i,fac=1;
    printf("enter the number:");
    scanf("%d",&n);
    for(i=1;i<=n;++i)
    {
        fac=fac*i;
    }
     printf("factorial of %d is 
%d",n,fac);
    return0;
}
```

Q. 3 Write a C program to check whether a number is palindrome or not.

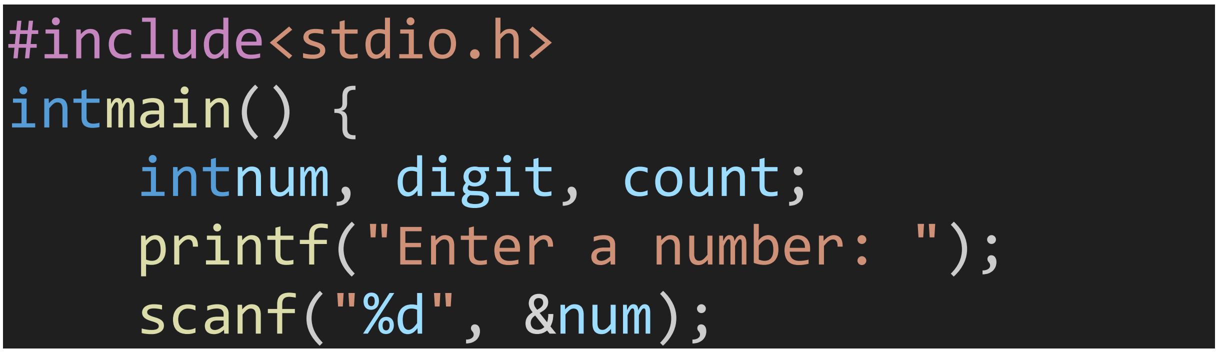


```
#include<stdio.h>
intmain()
{
```

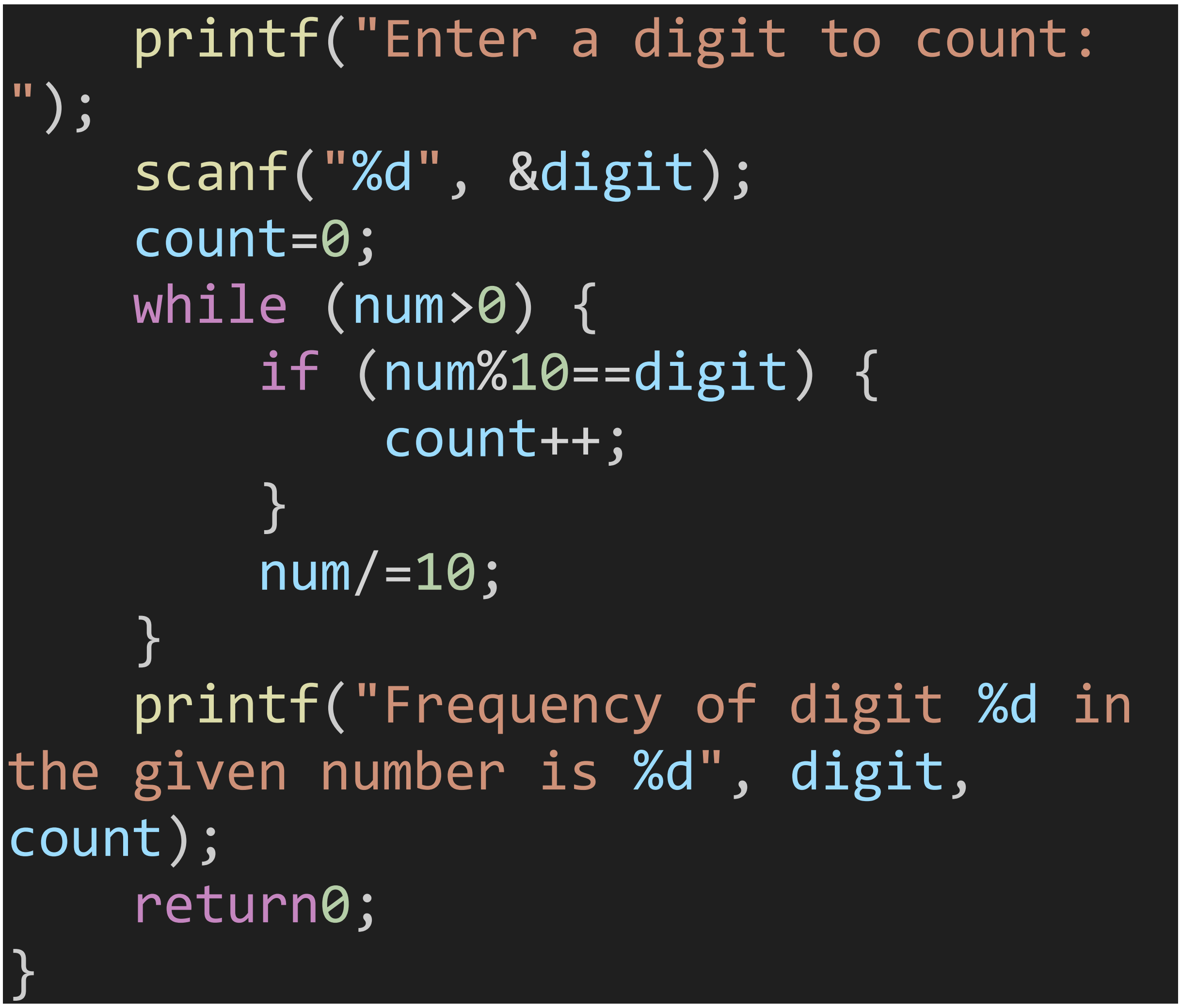


```
    intn,i,r,rev=0;
    printf("enter the number:");
    scanf("%d",&n);
    i=n;
    while(i!=0)
    {
        r=i%10;
        rev=rev*10+r;
        i=i/10;
    }
    if(rev==n)
    {
        printf("palindrome");
    }
    else{
        printf("not palindrome");
    }
    return0;

}
```

Q. 4 Write a C program to count frequency of digits in a given number.

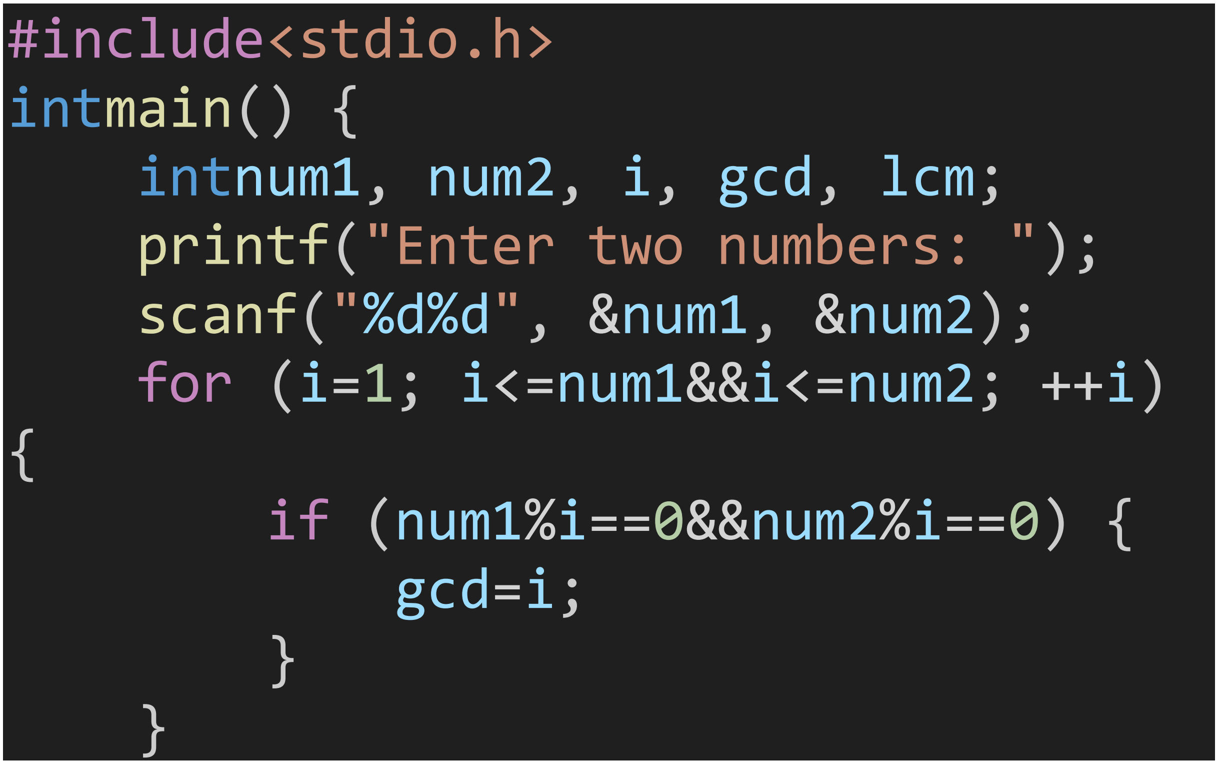


```
#include<stdio.h>
intmain() {
    intnum, digit, count;
    printf("Enter a number: ");
    scanf("%d", &num);
```

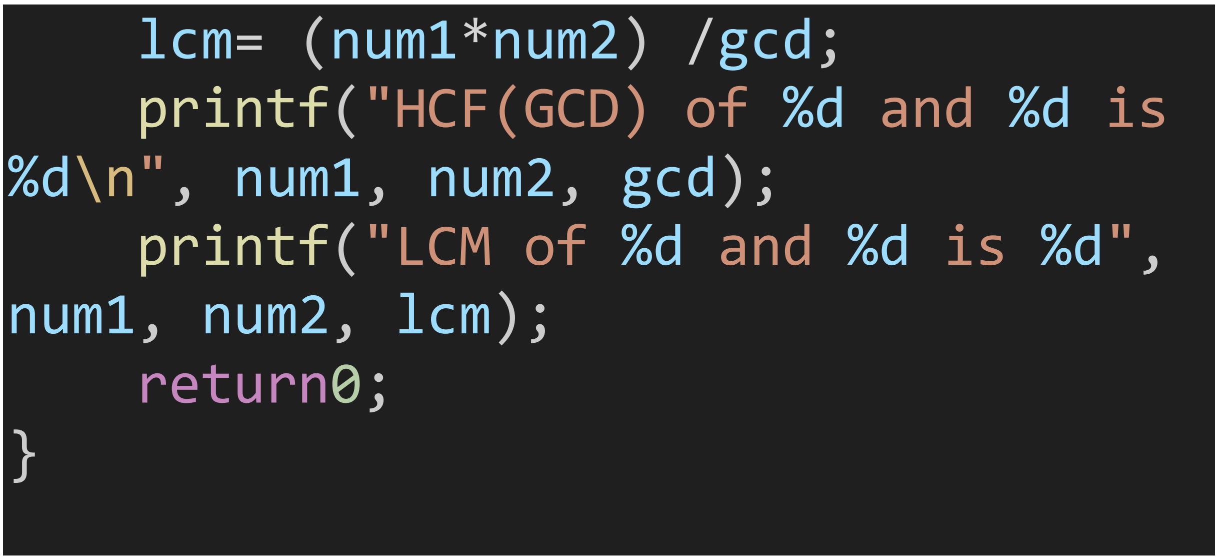


```
    printf("Enter a digit to count:
");
    scanf("%d", &digit);
    count=0;
    while (num>0) {
        if (num%10==digit) {
            count++;
        }
        num/=10;
    }
    printf("Frequency of digit %d in
the given number is %d", digit,
count);
    return0;
}
```

Q. 5 Write a C program to find HCF(GCD) AND LCM of two numbers

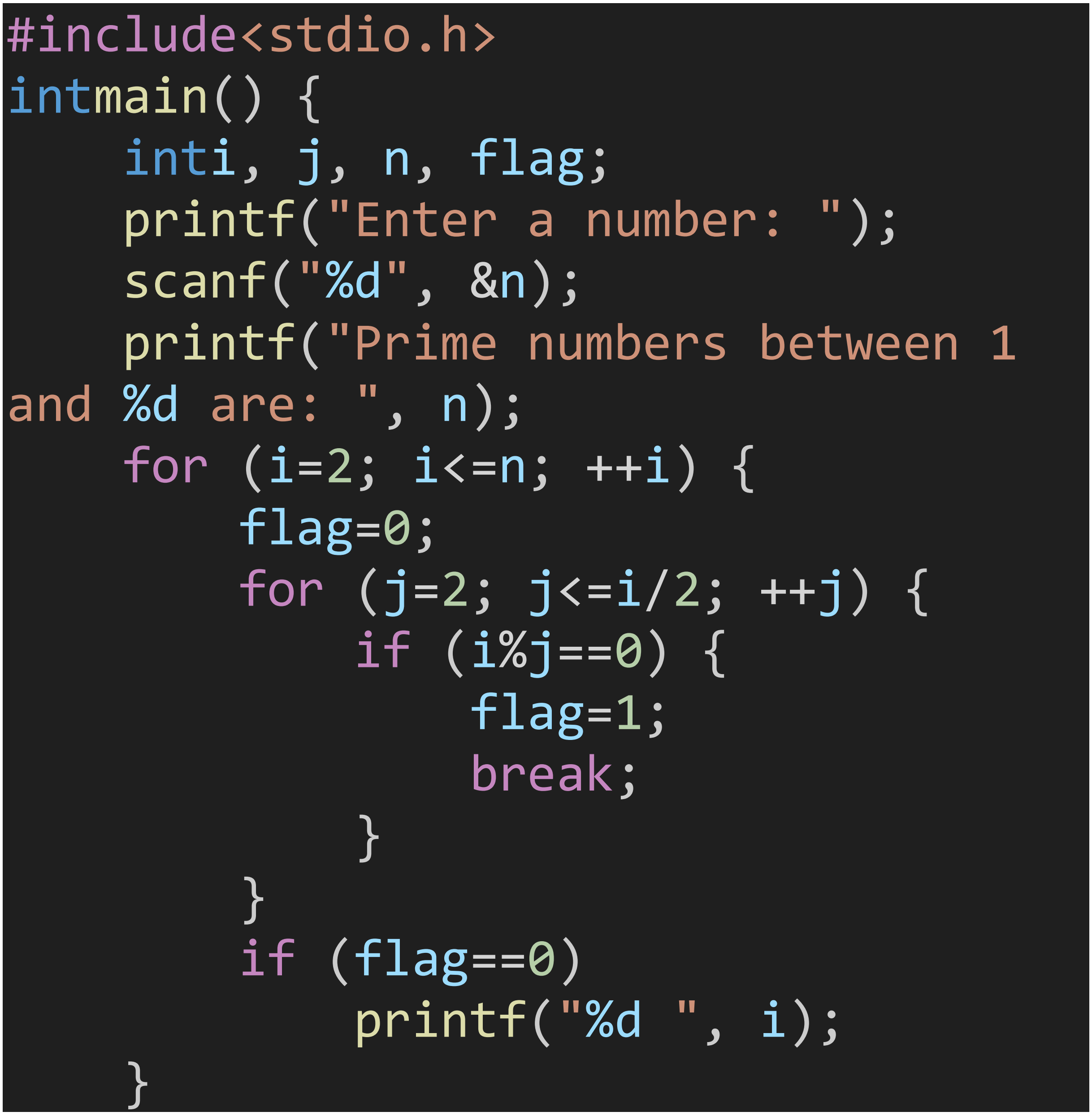


```
#include<stdio.h>
intmain() {
    intnum1, num2, i, gcd, lcm;
    printf("Enter two numbers: ");
    scanf("%d%d", &num1, &num2);
    for (i=1; i<=num1&&i<=num2; ++i)
{
        if (num1%i==0&&num2%i==0) {
            gcd=i;
        }
    }
```



```
    lcm= (num1*num2) /gcd;
    printf("HCF(GCD) of %d and %d is %d\n", num1, num2, gcd);
    printf("LCM of %d and %d is %d", num1, num2, lcm);
    return0;
}
```

Q. 6 Write a C program to print all prime numbers between 1 to n.



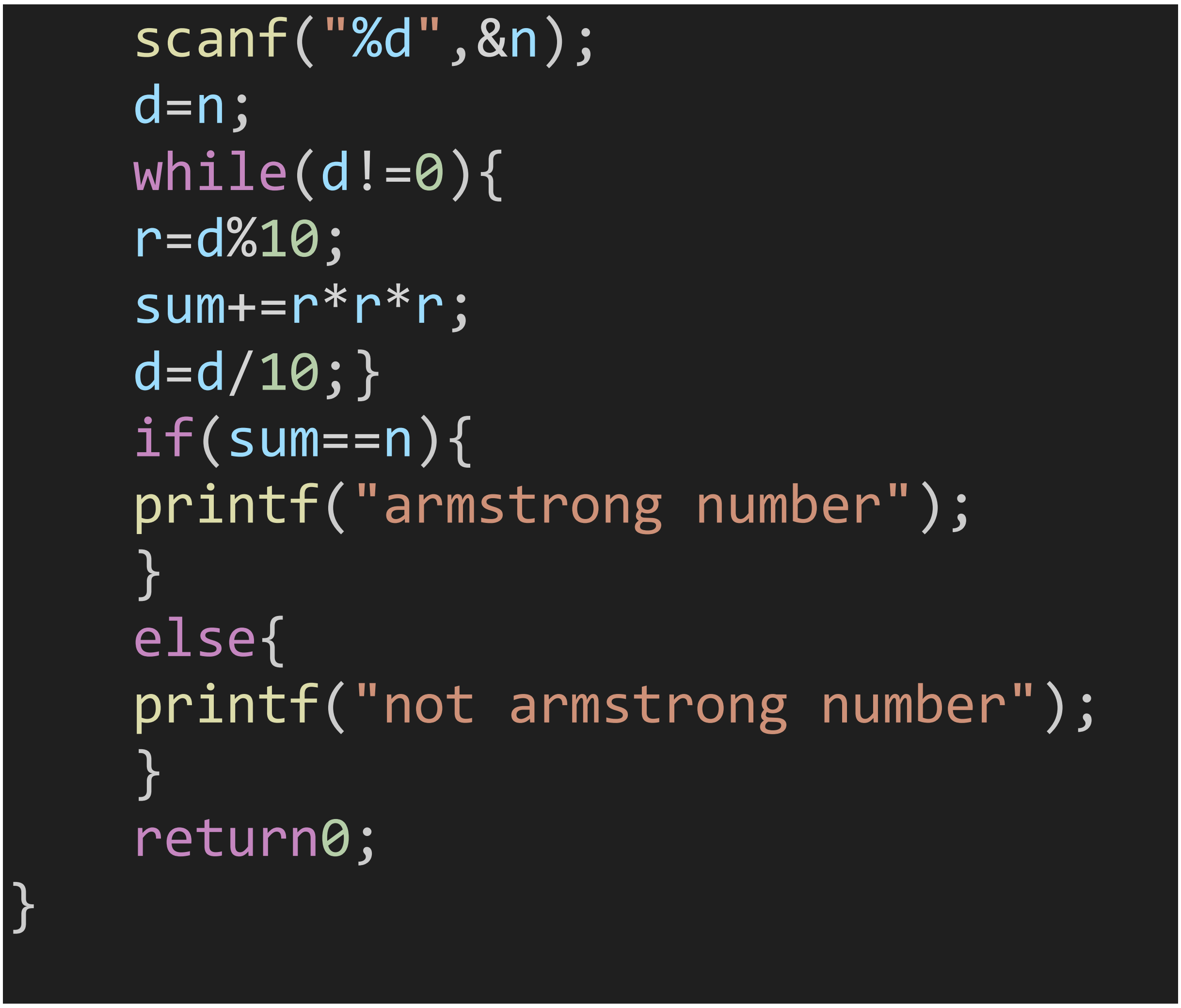
```
#include<stdio.h>
intmain() {
    inti, j, n, flag;
    printf("Enter a number: ");
    scanf("%d", &n);
    printf("Prime numbers between 1 and %d are: ", n);
    for (i=2; i<=n; ++i) {
        flag=0;
        for (j=2; j<=i/2; ++j) {
            if (i%j==0) {
                flag=1;
                break;
            }
        }
        if (flag==0)
            printf("%d ", i);
    }
    return0;
}
```

Q. 7 Write a C program to print Fibonacci series up to n terms.

```
#include<stdio.h>
intmain() {
    inti, n, t1=0, t2=1, nextTerm;
    printf("Enter the number of 
terms: ");
    scanf("%d", &n);
    printf("Fibonacci Series: ");
    for (i=1; i<=n; ++i) {
        printf("%d, ", t1);
        nextTerm=t1+t2;
        t1=t2;
        t2=nextTerm;
    }
    return0;
}
```

Q. 8 Write a C program to print Armstrong numbers from 1 to n AND check a given number is Armstrong numbers or not.

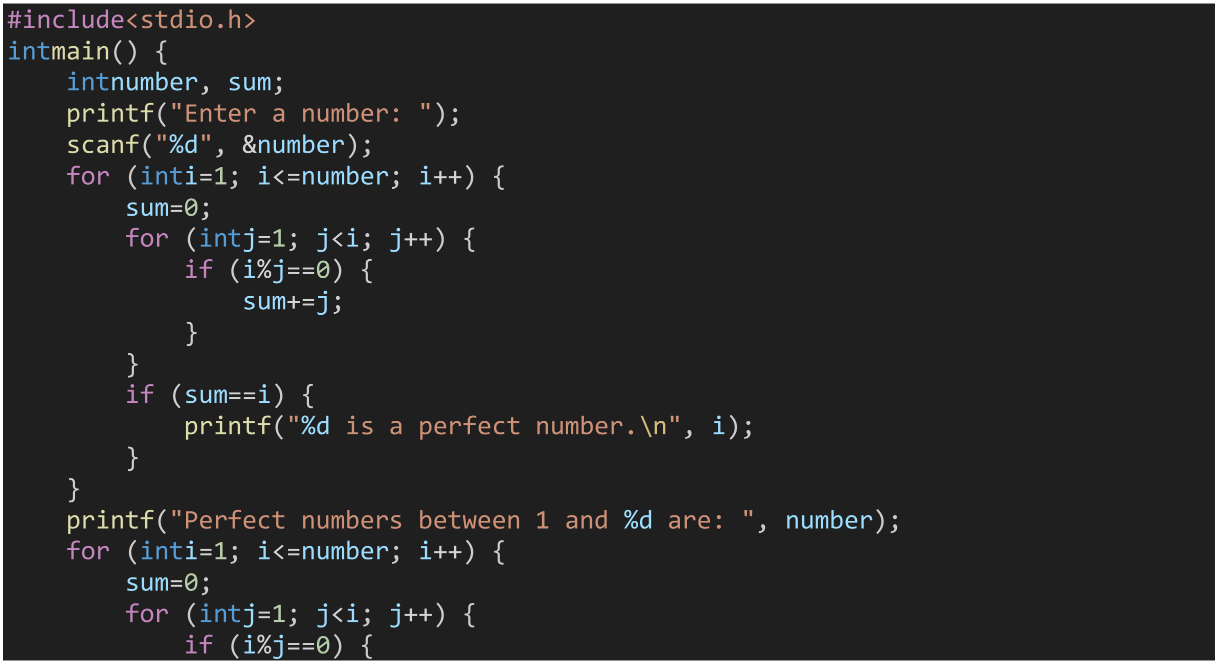
```
#include<stdio.h>
intmain()
{
    intn,r,d,sum=0;
    printf("enter the number:");
```



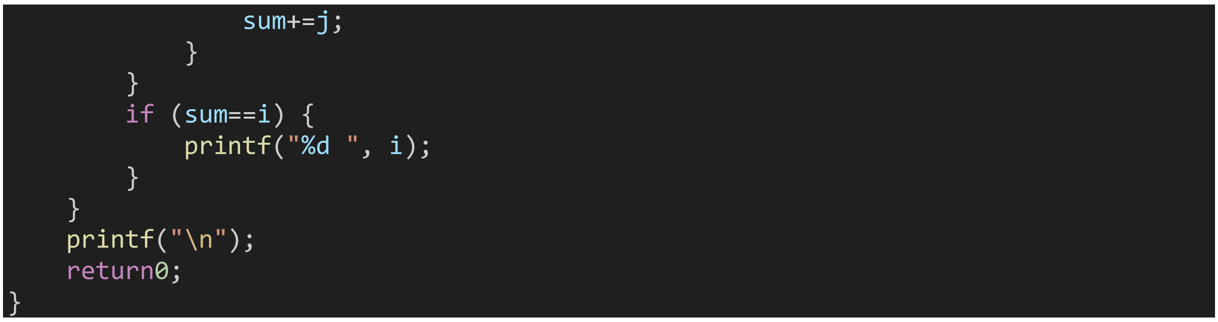
```
    scanf("%d",&n);
    d=n;
    while(d!=0){
    r=d%10;
    sum+=r*r*r;
    d=d/10;}
    if(sum==n){
    printf("armstrong number");
    }
    else{
    printf("not armstrong number");
    }
    return0;
}
```

H.O.T.S Questions

Q. 9 Write a C program to print all Perfect numbers between 1 to n AND Check a given number is Perfect numbers or not.



```
#include<stdio.h>
intmain() {
    intnumber, sum;
    printf("Enter a number: ");
    scanf("%d", &number);
    for (inti=1; i<=number; i++) {
        sum=0;
        for (intj=1; j<i; j++) {
            if (i%j==0) {
                sum+=j;
            }
        }
        if (sum==i) {
            printf("%d is a perfect number.\n", i);
        }
    }
    printf("Perfect numbers between 1 and %d are: ", number);
    for (inti=1; i<=number; i++) {
        sum=0;
        for (intj=1; j<i; j++) {
            if (i%j==0) {
```



```
                sum+=j;
            }
        }
        if (sum==i) {
            printf("%d ", i);
        }
    }
    printf("\n");
    return0;
}
```

Q. 10 Write a C program to print all Strong Numbers between 1 to n.

```
#include <stdio.h>
int main() {
    int n;
printf("Enter the value of n: ");
scanf("%d", &n);
printf("Strong numbers between 1 and %d are:\n", n);
    for (int i = 1; i<= n; i++) {
        int originalNum = i;
        int sum = 0;
        int num = i;
        while (num> 0) {
            int digit = num % 10;
            int factorial = 1;
            for (int j = 1; j <= digit; j++) {
                factorial *= j;
            }
            sum += factorial;
num /= 10;
        }
        if (sum == originalNum) {
printf("%d\n", originalNum);
        }
    }
    return 0;
}
```

Week 5 C Programming Questions

1.(a):

```
#include <stdio.h>
int main() {
  int rows = 4;
  for (int i = 1; i<= rows; i++) {
    for (int j = 1; j <= 5; j++) {
printf("*");
    }
printf("\n");
  }
  return 0;
}
```

(b):

```
#include <stdio.h>
int main() {
  int rows = 5;
  for (int i = 1; i<= rows; i++) {
    for (int j = 1; j <= rows; j++) {
printf("%d", j);
    }
printf("\n");
  }
  return 0;
}
```

(c):

```
#include <stdio.h>
int main() {
  int rows = 4;
```

```
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= i; j++) {
printf("%d", j);
        }
printf("\n");
    }
    return 0;
}
```

(d):

```
#include <stdio.h>
int main() {
    int rows = 4;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= i; j++) {
printf("%d", i);
        }
printf("\n");
    }
    return 0;
}
```

(e):

```
#include <stdio.h>
int main() {
    int rows = 4;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= i; j++) {
printf("*");
        }
printf("\n");
    }
    return 0;
}
```

(f):

```
#include <stdio.h>
int main() {
   int rows = 4;
   for (int i = 0; i< rows; i++) {
      for (int j = 0; j < rows - i - 1; j++) {
printf(" ");
      }
      for (int k = 0; k <= i; k++) {
printf("%c", 'A' + k);
      }
printf("\n");
   }
   return 0;
}
```

(g):

```
#include <stdio.h>
int main() {
   int rows = 4;
   int counter = 1;
   for (int i = 1; i<= rows; i++) {
      for (int j = 1; j <= i; j++) {
printf("%d", counter);
         counter++;
      }
printf("\n");
   }
   return 0;
}
```

(h):

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

```
int main() {
    int rows = 5;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= i; j++) {
printf("%d", j % 2);
        }
printf("\n");
    }
    return 0;
}
```

(i):

```
#include <stdio.h>
int main() {
    int rows = 5;
    for (int i = 5; i>= 1; i--) {
        for (int j = 5; j >= i; j--) {
printf("%d", j);
        }
printf("\n");
    }
    return 0;
}
```

(j):

```
#include <stdio.h>
int main() {
    int rows = 5;
    for (int i = 1; i<= rows; i++) {
        for (int j = 5; j >= i; j--) {
printf("%d", j);
        }
printf("\n");
    }
    return 0;
}
```

(k):

```
#include <stdio.h>
int main() {
    int rows = 5;
    int cols = 5;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= cols; j++) {
            if (i == 1 || i == rows || j == 1 || j == cols) {
printf("*");
            } else {
printf(" ");
            }
        }
printf("\n");
    }
    return 0;
}
```

(L):

```
#include <stdio.h>
int main() {
    int rows = 4;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= rows - i; j++) {
printf(" ");
        }
        for (int k = 1; k <= 2 * i - 1; k++) {
printf("*");
        }
printf("\n");
    }
    return 0;
}
```

(m):

```
#include <stdio.h>
int main() {
    int rows = 4;
    for (int i = 1; i<= rows; i++) {
        for (int j = 1; j <= rows - i; j++) {
printf(" ");
        }
        for (int k = 1; k <= 2 * i - 1; k++) {
printf("*");
        }
printf("\n");
    }
    for (int i = rows - 1; i>= 1; i--) {
        for (int j = 1; j <= rows - i; j++) {
printf(" ");
        }
        for (int k = 1; k <= 2 * i - 1; k++) {
printf("*");
        }
printf("\n");
    }
    return 0;
}
```

(n):

```
#include <stdio.h>
int main() {
  int i, j, k;
  for (i = 3; i>= 0; i--) {
    for (k = 0; k <i; k++) {
```

```
printf(" ");
    }
    for (j = 0; j <= 3 - i; j++) {
printf("%d", 7 - (i * 2) + j);
    }
printf("\n");
  }
  return 0;
}
```

Week 6 C Programming Questions

1. Write a menu driven program to insert and delete elements of kth position to an array of size N.

```
#include <stdio.h>

int main() {
    int N, choice, k, i;
printf("Enter the size of the array: ");
scanf("%d", &N);
    int arr[N];
    for (i = 0; i< N; i++) {
printf("Enter element at position %d: ", i + 1);
scanf("%d", &arr[i]);
    }
    while (1) {
printf("\nMenu:\n");
printf("1. Insert element at kth position\n");
printf("2. Delete element at kth position\n");
printf("3. Display array\n");
printf("4. Exit\n");
printf("Enter your choice: ");
scanf("%d", &choice);
```

```
        switch (choice) {
            case 1:
printf("Enter the position (1 to %d) to insert element: ", N + 1);
scanf("%d", &k);
                if (k < 1 || k > N + 1) {
printf("Invalid position. Position should be between 1 and
%d.\n", N + 1);
                } else {
printf("Enter the element to insert: ");
                    int newElement;
scanf("%d", &newElement);

                    for (i = N - 1; i>= k - 1; i--) {
arr[i + 1] = arr[i];
                    }
arr[k - 1] = newElement;
                    N++;
printf("Element inserted successfully.\n");
                }
break;
            case 2:
printf("Enter the position (1 to %d) to delete element: ", N);
scanf("%d", &k);
                if (k < 1 || k > N) {
printf("Invalid position. Position should be between 1 and
%d.\n", N);
                } else {
                    for (i = k - 1; i< N - 1; i++) {
arr[i] = arr[i + 1];
                    }
                    N--;
printf("Element deleted successfully.\n");
                }
break;
            case 3:
```

```
printf("Array elements: ");
                for (i = 0; i< N; i++) {
printf("%d ", arr[i]);
                }
printf("\n");
break;
            case 4:
printf("Exiting the program.\n");
                return 0;

            default:
printf("Invalid choice. Please enter a valid option.\n");
        }
    }
    return 0;
}
```

2. Write the program to print the biggest and smallest element in an array.

```
#include <stdio.h>
int main() {
    int N, i;
printf("Enter the size of the array: ");
scanf("%d", &N);
    int arr[N];
    for (i = 0; i< N; i++) {
printf("Enter element at position %d: ", i + 1);
scanf("%d", &arr[i]);
    }
    int largest = arr[0];
    int smallest = arr[0];
    for (i = 1; i< N; i++) {
        if (arr[i] > largest) {
            largest = arr[i];
        }
        if (arr[i] < smallest) {
            smallest = arr[i];
        }
    }
printf("The largest element in the array is: %d\n", largest);
printf("The smallest element in the array is: %d\n", smallest);
    return 0;
}
```

3. Write the program to print the sum and average of an array.

```
#include <stdio.h>
int main() {
    int N, i;
printf("Enter the size of the array: ");
scanf("%d", &N);
    int arr[N];
    for (i = 0; i< N; i++) {
printf("Enter element at position %d: ", i + 1);
scanf("%d", &arr[i]);
    }
    int sum = 0;
    float average;
    for (i = 0; i< N; i++) {
        sum += arr[i];
    }
    average = (float)sum / N;
printf("The sum of the elements in the array is: %d\n", sum);
printf("The average of the elements in the array is: %.2f\n",
average);
    return 0;
}
```

4. Write the program to sort an array using bubble sort.

```
#include <stdio.h>
int main() {
   int N, i, j, temp;
printf("Enter the size of the array: ");
scanf("%d", &N);
   int arr[N];
   for (i = 0; i< N; i++) {
printf("Enter element at position %d: ", i + 1);
scanf("%d", &arr[i]);
   }
   for (i = 0; i< N - 1; i++) {
      for (j = 0; j < N - i - 1; j++) {
         if (arr[j] >arr[j + 1]) {
            temp = arr[j];
arr[j] = arr[j + 1];
arr[j + 1] = temp;
         }
      }
   }
printf("Sorted array: ");
   for (i = 0; i< N; i++) {
printf("%d ", arr[i]);
   }
printf("\n");
   return 0;
}
```

5.Write the program to search an element using linear search as well as binary search.

```
#include <stdio.h>
int main() {
   int N, i, element;
```

```
printf("Enter the size of the array: ");
scanf("%d", &N);
   int arr[N];
printf("Enter the elements of the array:\n");
   for (i = 0; i< N; i++) {
scanf("%d", &arr[i]);
   }
printf("\nEnter the element to search using linear search: ");
scanf("%d", &element);
   int linearIndex = -1;
   for (i = 0; i< N; i++) {
      if (arr[i] == element) {
linearIndex = i;
break;
      }
   }
   if (linearIndex != -1) {
printf("Element %d found at position %d using linear search.\n",
element, linearIndex + 1);
   } else {
printf("Element %d not found in the array using linear search.\n",
element);
   }
printf("\nEnter the element to search using binary search: ");
scanf("%d", &element);
   int low = 0, high = N - 1, mid, binaryIndex = -1;
   while (low <= high) {
      mid = (low + high) / 2;
      if (arr[mid] == element) {
binaryIndex = mid;
break;
      } else if (arr[mid] < element) {
         low = mid + 1;
      } else {
         high = mid - 1;
```

```
        }
    }
    if (binaryIndex != -1) {
printf("Element %d found at position %d using binary search.\n", 
element, binaryIndex + 1);
    } else {
printf("Element %d not found in the array using binary search.\n", 
element);
    }
    return 0;
}
```

6.Take an array of 20 integer inputs from user and print the following:

a. number of positive numbers

b. number of negative numbers

c. number of odd numbers

d. number of even numbers e. number of 0.

```
#include <stdio.h>
int main() {
    int arr[20];
    int positiveCount = 0, negativeCount = 0, oddCount = 0, evenCount 
= 0, zeroCount = 0;
printf("Enter 20 integers:\n");
    for (int i = 0; i< 20; i++) {
scanf("%d", &arr[i]);
    }
    for (int i = 0; i< 20; i++) {
        if (arr[i] > 0) {
positiveCount++;
        } else if (arr[i] < 0) {
negativeCount++;
        } else {
```

```
zeroCount++;
        }
        if (arr[i] % 2 == 0) {
evenCount++;
        } else {
oddCount++;
        }
    }
printf("\na. Number of positive numbers: %d\n", positiveCount);
printf("b. Number of negative numbers: %d\n", negativeCount);
printf("c. Number of odd numbers: %d\n", oddCount);
printf("d. Number of even numbers: %d\n", evenCount);
printf("e. Number of zeros: %d\n", zeroCount);
    return 0;
}
```

7.Take an array of 10 elements. Split it into middle and store the elements in two different arrays.

```
#include <stdio.h>
int main(){
    int initialArray[10];
    int firstHalf[5], secondHalf[5];
printf("Enter 10 integers:\n");
    for (int i = 0; i< 10; i++) {
scanf("%d", &initialArray[i]);
    }
    for (int i = 0; i< 5; i++) {
firstHalf[i] = initialArray[i];
secondHalf[i] = initialArray[i + 5];
    }
printf("\nINITIAL array: ");
    for (int i = 0; i< 10; i++) {
printf("%d, ", initialArray[i]);
    }
printf("\n");
printf("After splitting:\n");
printf("First Half: ");
   for (int i = 0; i< 5; i++) {
printf("%d, ", firstHalf[i]);
   }
printf("\n");
printf("Second Half: ");
   for (int i = 0; i< 5; i++) {
printf("%d, ", secondHalf[i]);
   }
printf("\n");
   return 0;
}
```

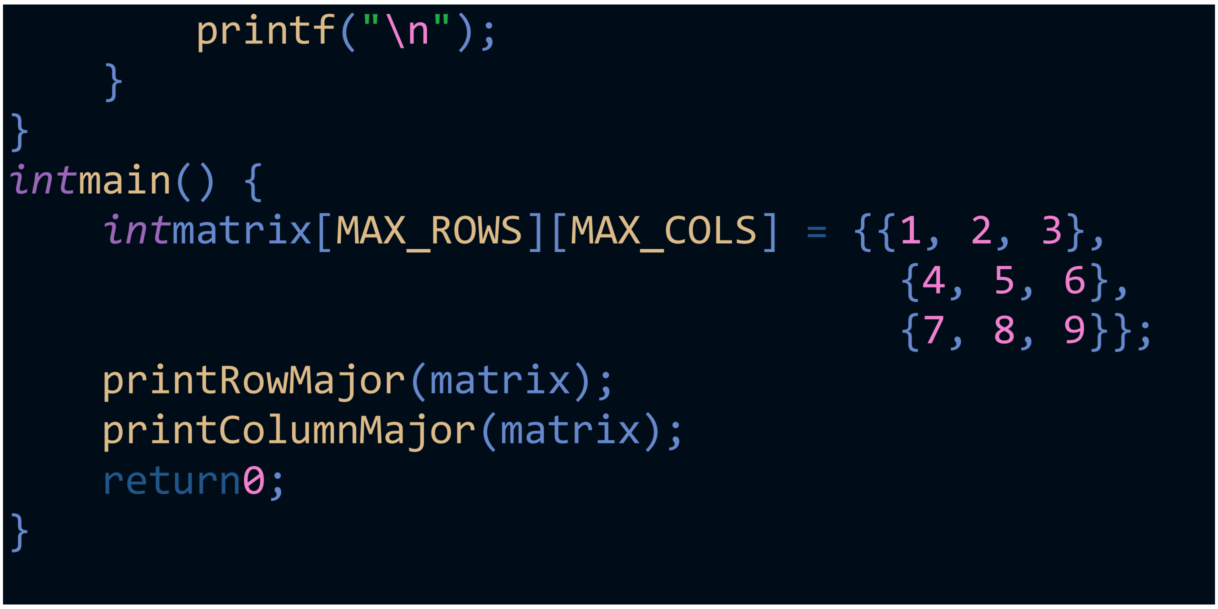
8.Write the program to count frequency of each element in an array.

```
#include <stdio.h>
int main() {
   int N;
printf("Enter the size of the array: ");
scanf("%d", &N);
   int arr[N];
printf("Enter %d integers:\n", N);
   for (int i = 0; i< N; i++) {
scanf("%d", &arr[i]);
   }
   int frequency[N];
   for (int i = 0; i< N; i++) {
      frequency[i] = 0;
   }
   for (int i = 0; i< N; i++) {
      if (frequency[i] == -1) {
continue;
      }
      for (int j = i + 1; j < N; j++) {
            if (arr[i] == arr[j]) {
                frequency[j] = -1;
                frequency[i]++;
            }
        }
    }
printf("\nFrequency of each element:\n");
    for (int i = 0; i< N; i++) {
        if (frequency[i] != -1) {
printf("%d occurs %d times.\n", arr[i], frequency[i] + 1);
        }
    }
    return 0;
}
```

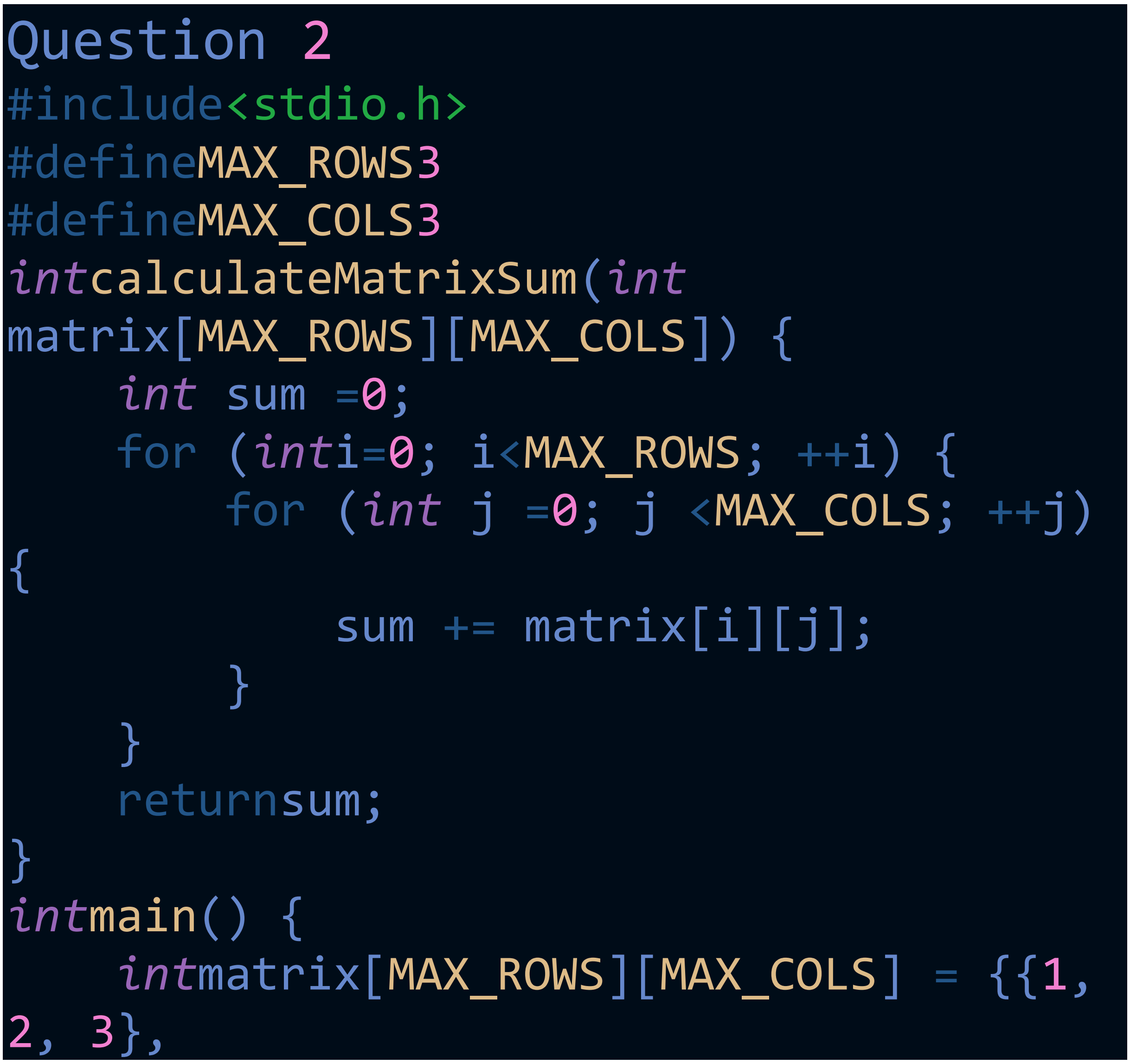
Week 7

Question 1

```
#include<stdio.h>
#defineMAX_ROWS3
#defineMAX_COLS3
voidprintRowMajor(int matrix[MAX_ROWS][MAX_COLS]) {
    printf("Row Major Order:\n");
    for (inti=0; i<MAX_ROWS; ++i) {
        for (int j =0; j <MAX_COLS; ++j) {
            printf("%d\t", matrix[i][j]);
        }
        printf("\n");
    }
}
voidprintColumnMajor(int
matrix[MAX_ROWS][MAX_COLS]) {
    printf("\nColumn Major Order:\n");
    for (int j =0; j <MAX_COLS; ++j) {
        for (inti=0; i<MAX_ROWS; ++i) {
            printf("%d\t", matrix[i][j]);
        }
```

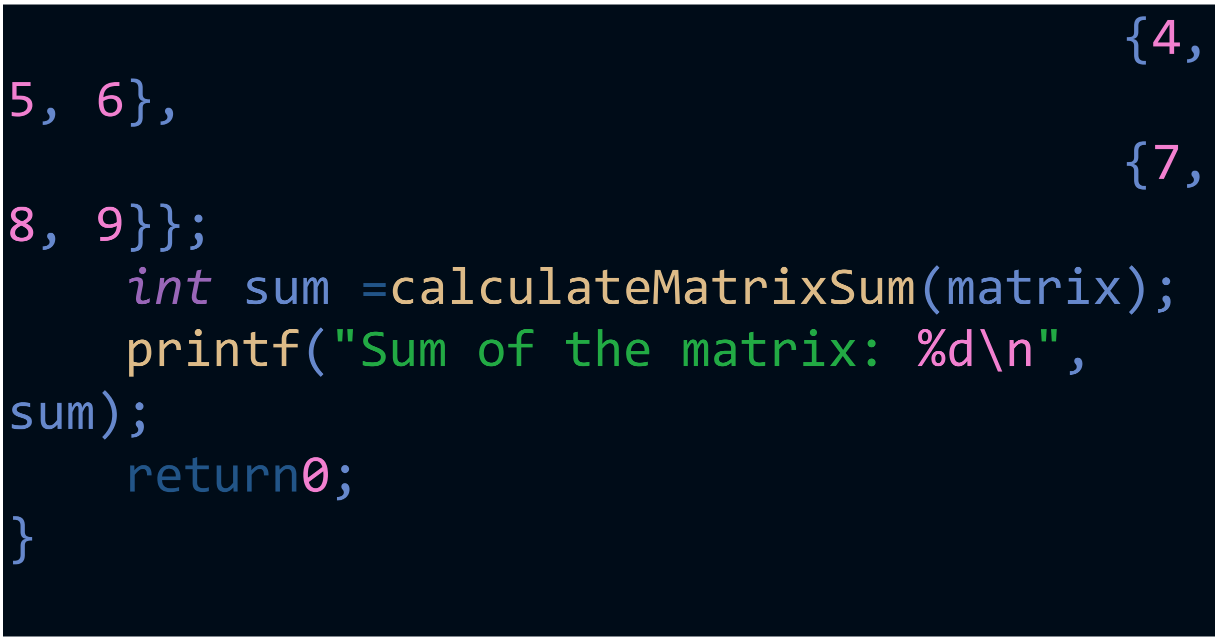


```
        printf("\n");
    }
}
intmain() {
    intmatrix[MAX_ROWS][MAX_COLS] = {{1, 2, 3},
                                      {4, 5, 6},
                                      {7, 8, 9}};
    printRowMajor(matrix);
    printColumnMajor(matrix);
    return0;
}
```

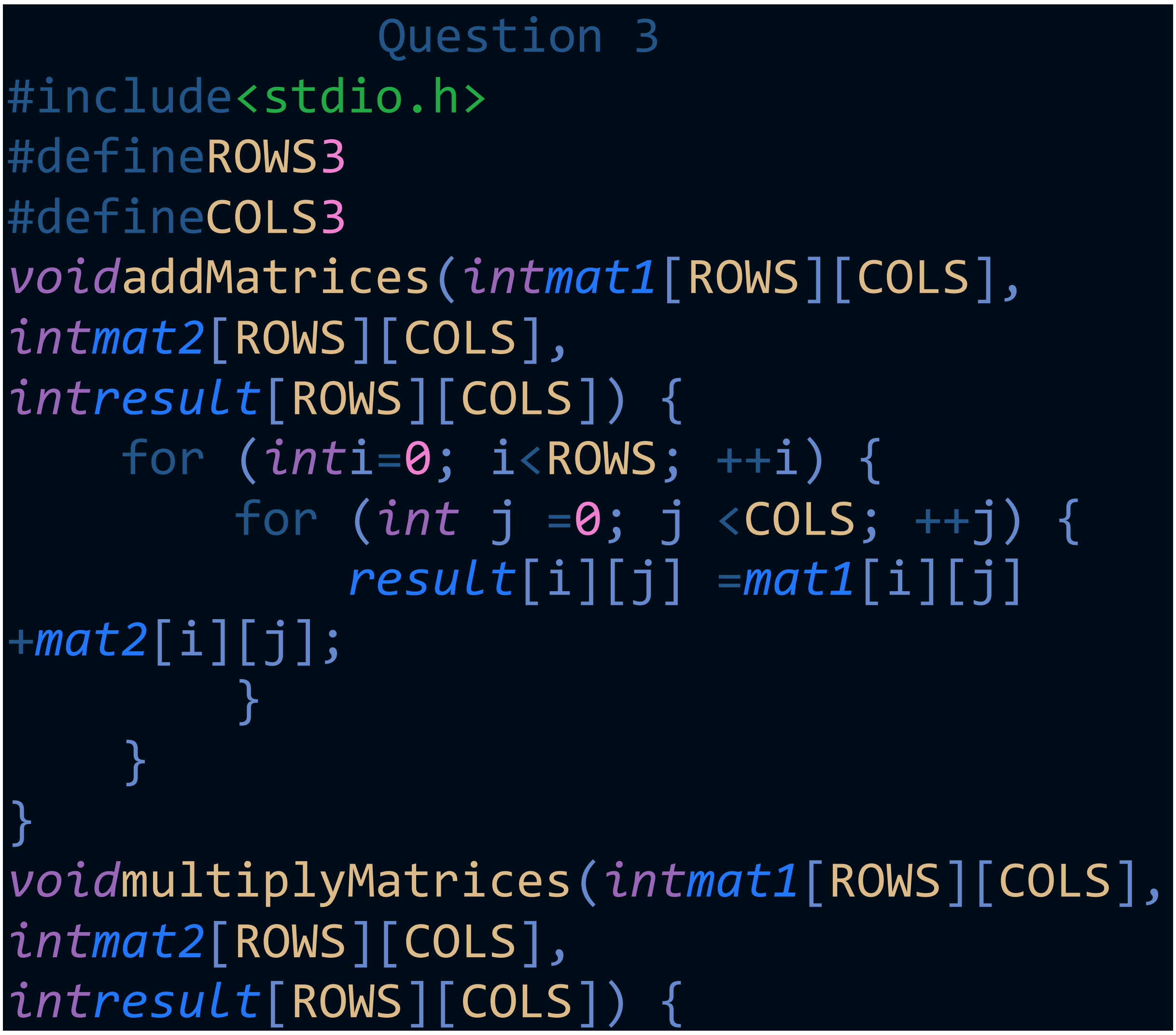


Question 2

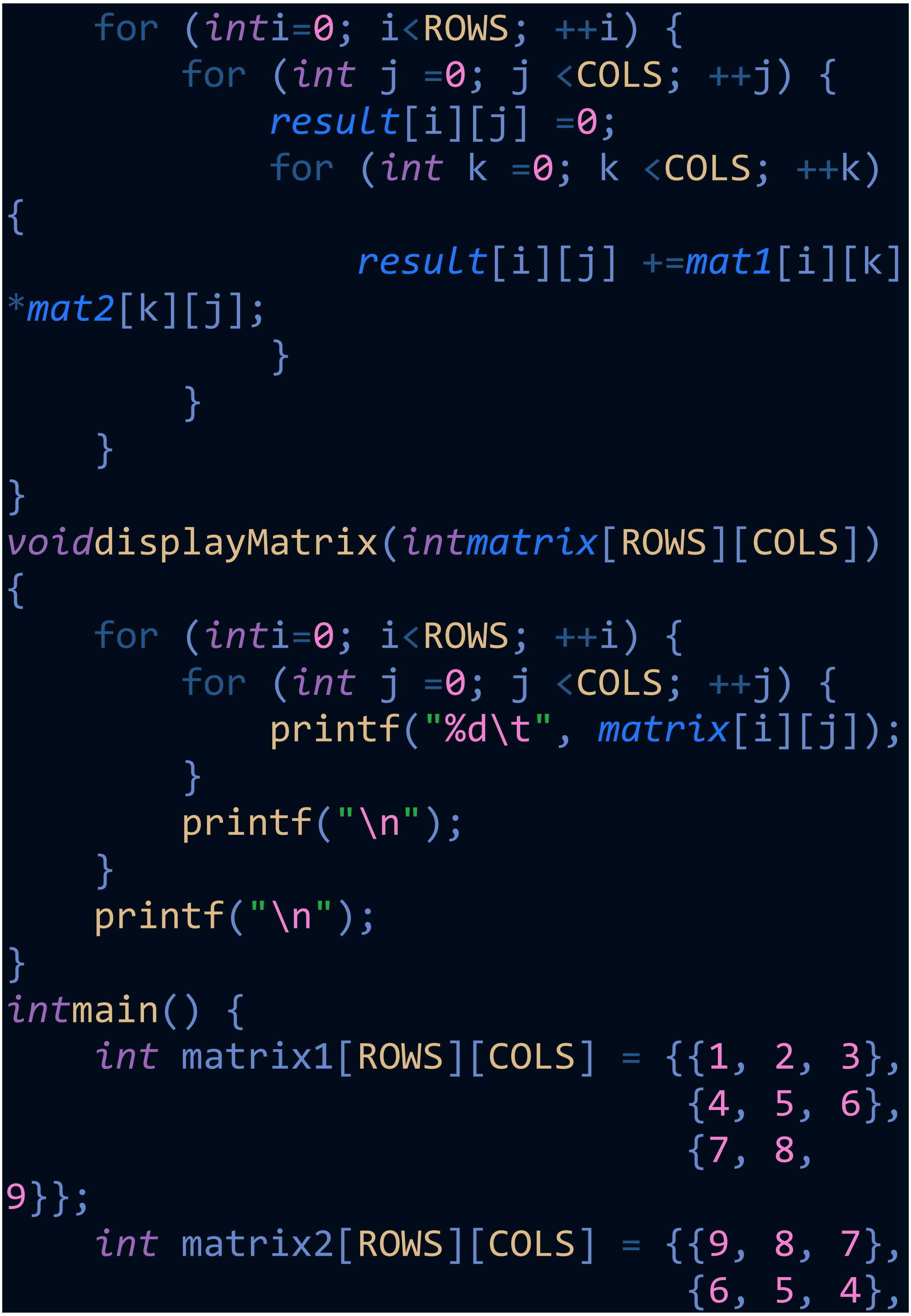
```
#include<stdio.h>
#defineMAX_ROWS3
#defineMAX_COLS3
intcalculateMatrixSum(int
matrix[MAX_ROWS][MAX_COLS]) {
    int sum =0;
    for (inti=0; i<MAX_ROWS; ++i) {
        for (int j =0; j <MAX_COLS; ++j)
{
            sum += matrix[i][j];
        }
    }
    returnsum;
}
intmain() {
    intmatrix[MAX_ROWS][MAX_COLS] = {{1,
2, 3},
```



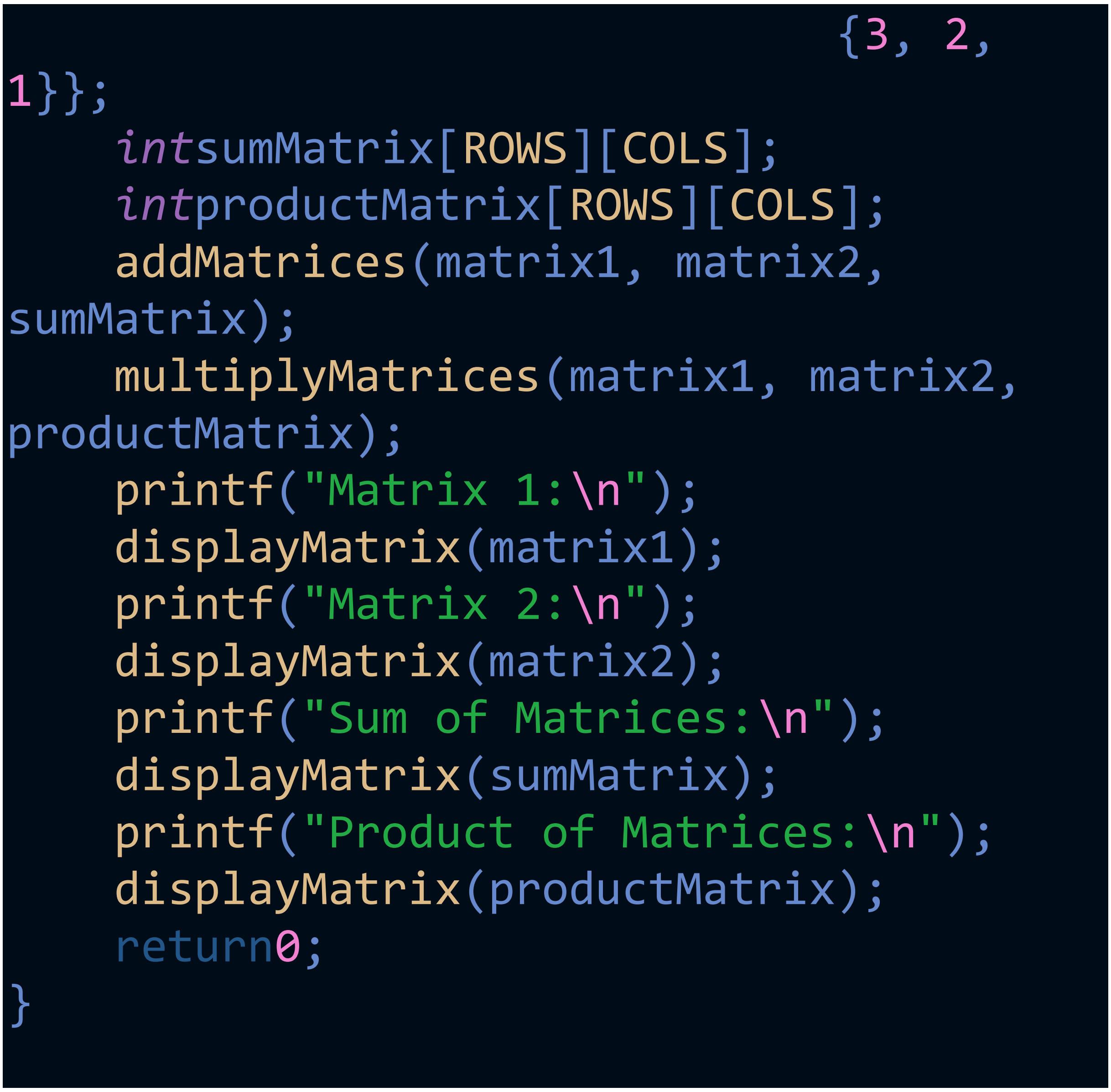
```
                                      {4,
5, 6},
                                      {7,
8, 9}};
    int sum =calculateMatrixSum(matrix);
    printf("Sum of the matrix: %d\n",
sum);
    return0;
}
```



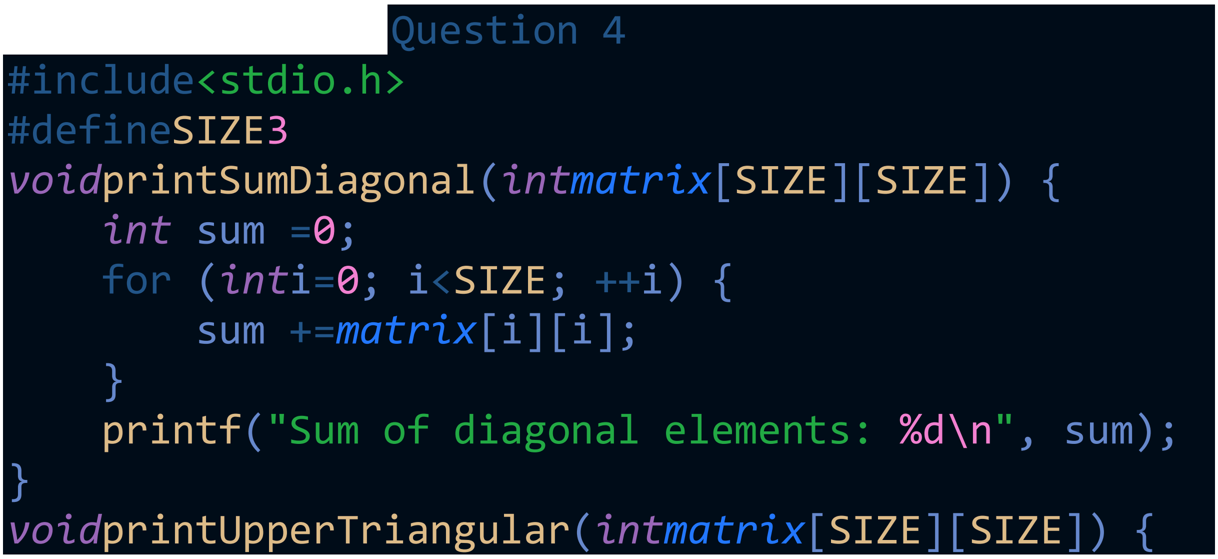
```
             Question 3
#include<stdio.h>
#defineROWS3
#defineCOLS3
voidaddMatrices(intmat1[ROWS][COLS],
intmat2[ROWS][COLS],
intresult[ROWS][COLS]) {
    for (inti=0; i<ROWS; ++i) {
        for (int j =0; j <COLS; ++j) {
            result[i][j] =mat1[i][j]
+mat2[i][j];
        }
    }
}
voidmultiplyMatrices(intmat1[ROWS][COLS],
intmat2[ROWS][COLS],
intresult[ROWS][COLS]) {
```



```
    for (inti=0; i<ROWS; ++i) {
        for (int j =0; j <COLS; ++j) {
            result[i][j] =0;
            for (int k =0; k <COLS; ++k)
{
                result[i][j] +=mat1[i][k]
*mat2[k][j];
            }
        }
    }
}
voiddisplayMatrix(intmatrix[ROWS][COLS])
{
    for (inti=0; i<ROWS; ++i) {
        for (int j =0; j <COLS; ++j) {
            printf("%d\t", matrix[i][j]);
        }
        printf("\n");
    }
    printf("\n");
}
intmain() {
    int matrix1[ROWS][COLS] = {{1, 2, 3},
                               {4, 5, 6},
                               {7, 8,
9}};
    int matrix2[ROWS][COLS] = {{9, 8, 7},
                               {6, 5, 4},
```

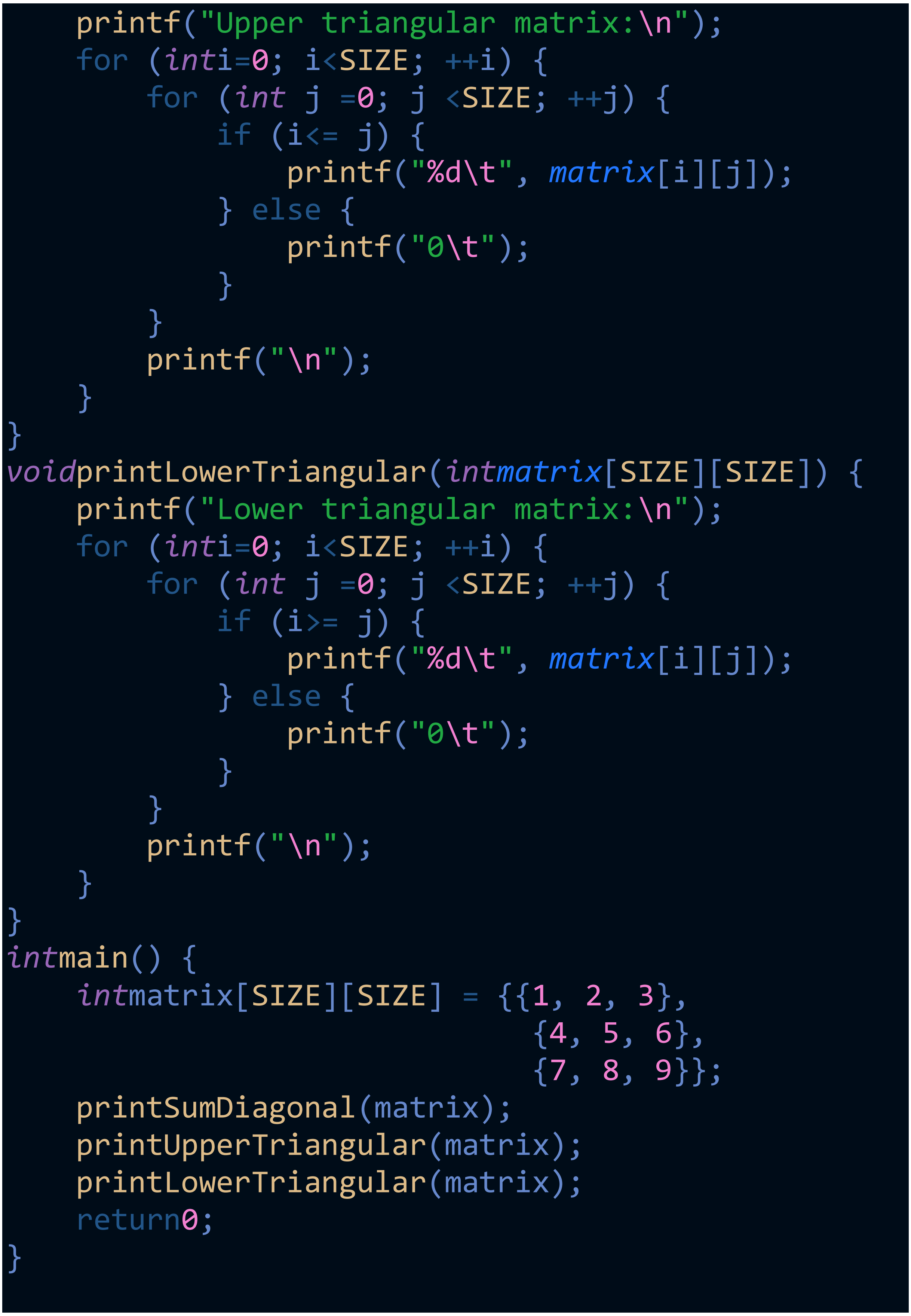


```
                                    {3, 2,
1}};
    intsumMatrix[ROWS][COLS];
    intproductMatrix[ROWS][COLS];
    addMatrices(matrix1, matrix2,
sumMatrix);
    multiplyMatrices(matrix1, matrix2,
productMatrix);
    printf("Matrix 1:\n");
    displayMatrix(matrix1);
    printf("Matrix 2:\n");
    displayMatrix(matrix2);
    printf("Sum of Matrices:\n");
    displayMatrix(sumMatrix);
    printf("Product of Matrices:\n");
    displayMatrix(productMatrix);
    return0;
}
```

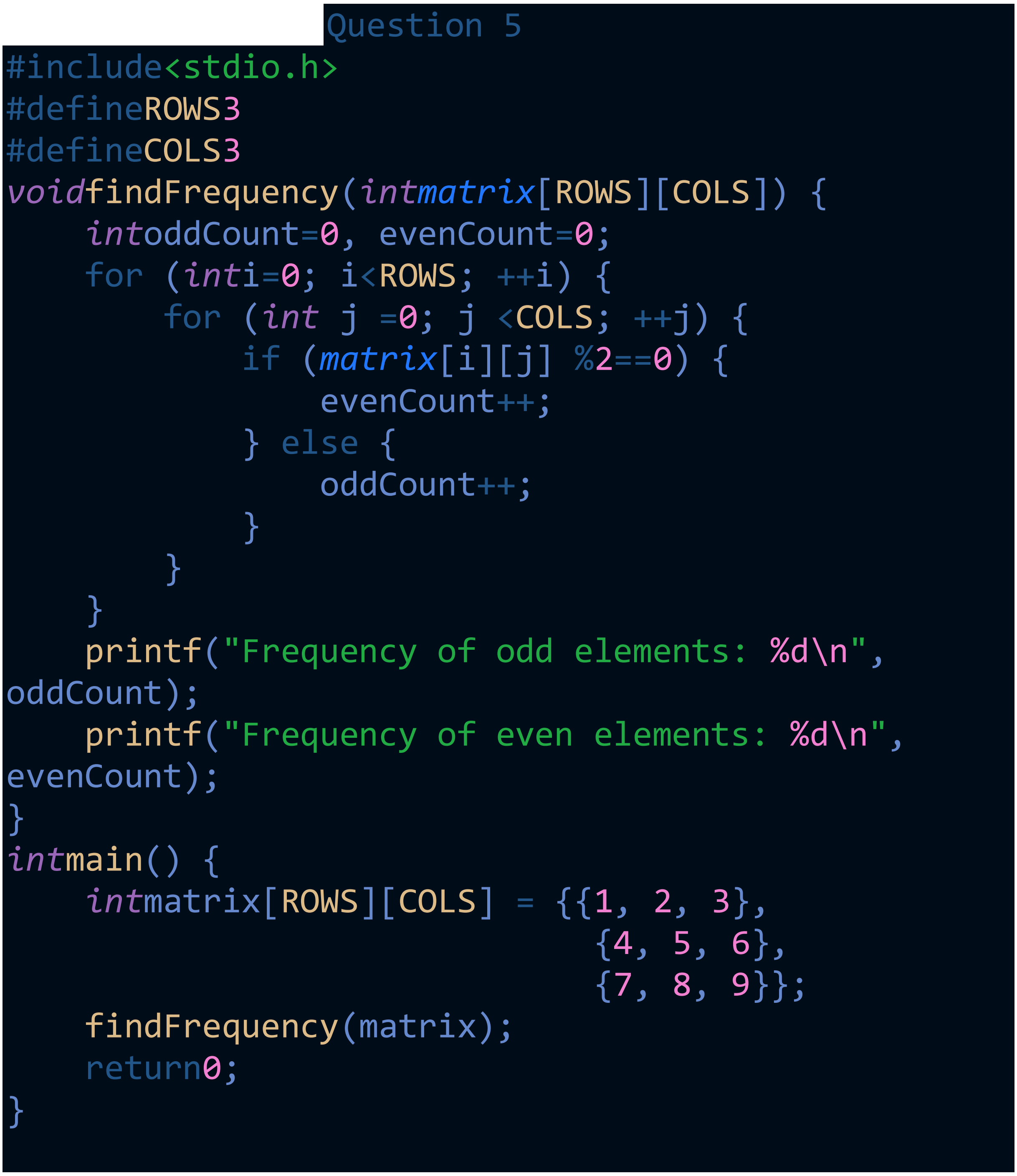


Question 4

```
#include<stdio.h>
#defineSIZE3
voidprintSumDiagonal(intmatrix[SIZE][SIZE]) {
    int sum =0;
    for (inti=0; i<SIZE; ++i) {
        sum +=matrix[i][i];
    }
    printf("Sum of diagonal elements: %d\n", sum);
}
voidprintUpperTriangular(intmatrix[SIZE][SIZE]) {
```

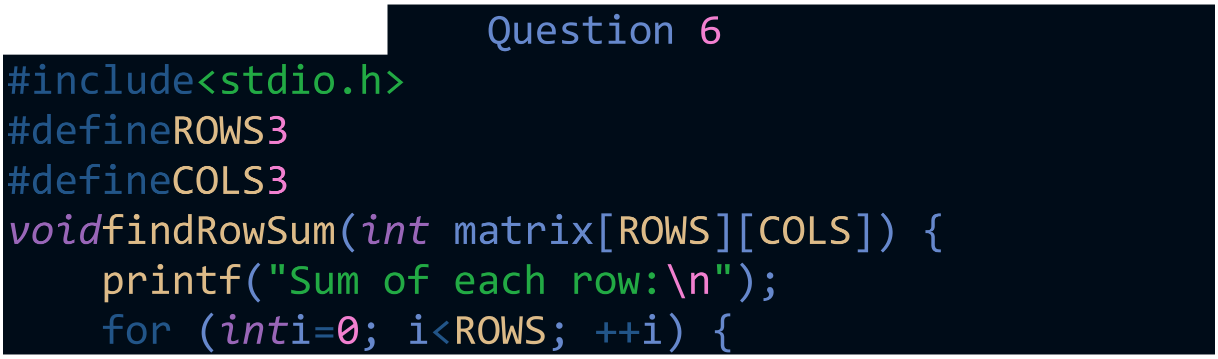


```
    printf("Upper triangular matrix:\n");
    for (inti=0; i<SIZE; ++i) {
        for (int j =0; j <SIZE; ++j) {
            if (i<= j) {
                printf("%d\t", matrix[i][j]);
            } else {
                printf("0\t");
            }
        }
        printf("\n");
    }
}
voidprintLowerTriangular(intmatrix[SIZE][SIZE]) {
    printf("Lower triangular matrix:\n");
    for (inti=0; i<SIZE; ++i) {
        for (int j =0; j <SIZE; ++j) {
            if (i>= j) {
                printf("%d\t", matrix[i][j]);
            } else {
                printf("0\t");
            }
        }
        printf("\n");
    }
}
intmain() {
    intmatrix[SIZE][SIZE] = {{1, 2, 3},
                              {4, 5, 6},
                              {7, 8, 9}};
    printSumDiagonal(matrix);
    printUpperTriangular(matrix);
    printLowerTriangular(matrix);
    return0;
}
```



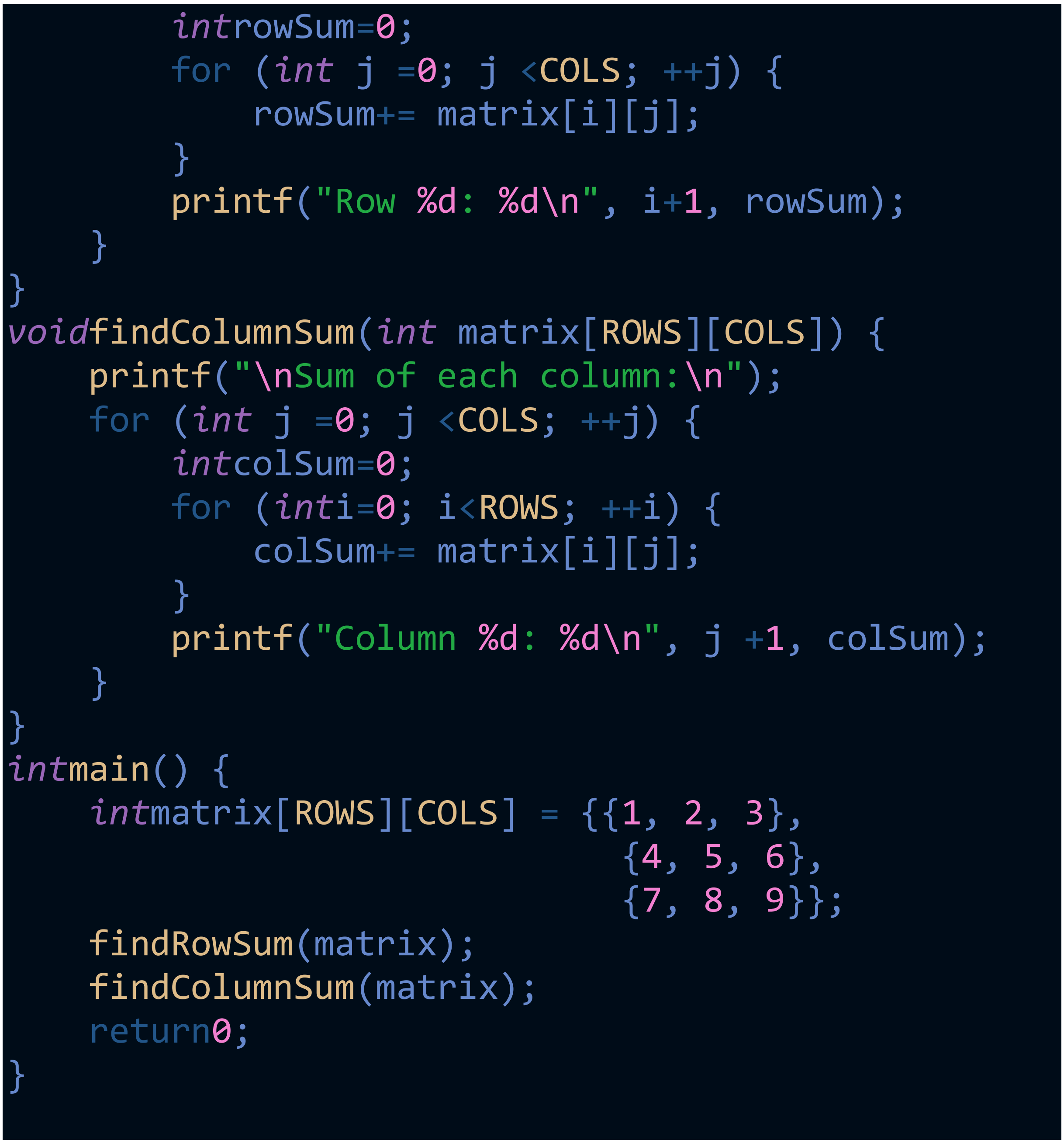
Question 5

```
#include<stdio.h>
#defineROWS3
#defineCOLS3
voidfindFrequency(intmatrix[ROWS][COLS]) {
    intoddCount=0, evenCount=0;
    for (inti=0; i<ROWS; ++i) {
        for (int j =0; j <COLS; ++j) {
            if (matrix[i][j] %2==0) {
                evenCount++;
            } else {
                oddCount++;
            }
        }
    }
    printf("Frequency of odd elements: %d\n",
oddCount);
    printf("Frequency of even elements: %d\n",
evenCount);
}
intmain() {
    intmatrix[ROWS][COLS] = {{1, 2, 3},
                              {4, 5, 6},
                              {7, 8, 9}};
    findFrequency(matrix);
    return0;
}
```



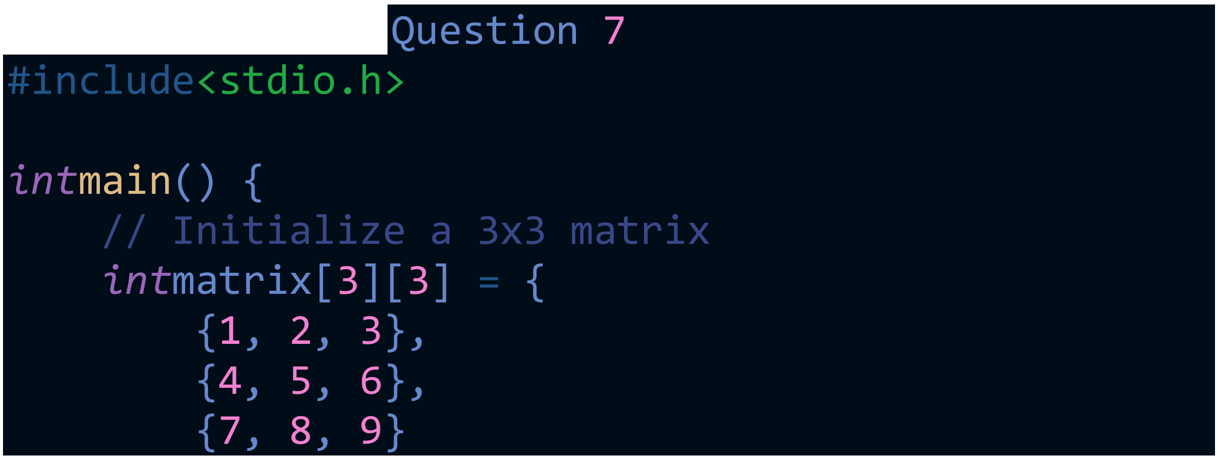
Question 6

```
#include<stdio.h>
#defineROWS3
#defineCOLS3
voidfindRowSum(int matrix[ROWS][COLS]) {
    printf("Sum of each row:\n");
    for (inti=0; i<ROWS; ++i) {
```

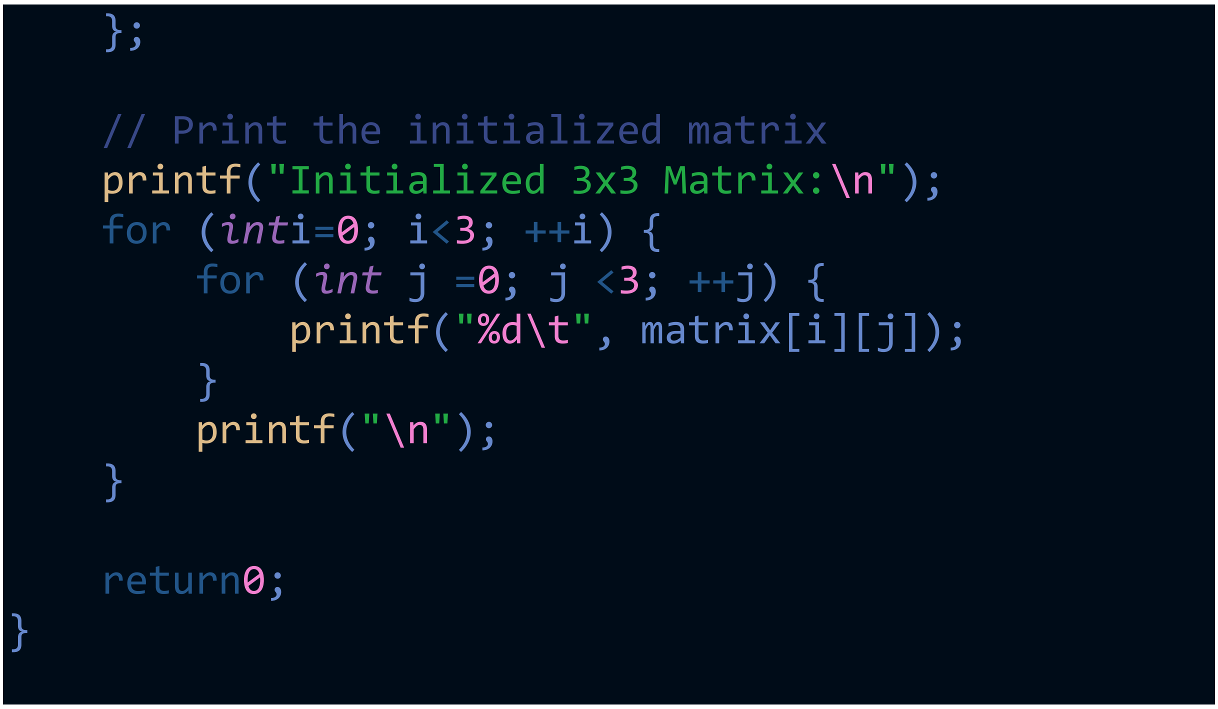


```
        introwSum=0;
        for (int j =0; j <COLS; ++j) {
            rowSum+= matrix[i][j];
        }
        printf("Row %d: %d\n", i+1, rowSum);
    }
}
voidfindColumnSum(int matrix[ROWS][COLS]) {
    printf("\nSum of each column:\n");
    for (int j =0; j <COLS; ++j) {
        intcolSum=0;
        for (inti=0; i<ROWS; ++i) {
            colSum+= matrix[i][j];
        }
        printf("Column %d: %d\n", j +1, colSum);
    }
}
intmain() {
    intmatrix[ROWS][COLS] = {{1, 2, 3},
                              {4, 5, 6},
                              {7, 8, 9}};
    findRowSum(matrix);
    findColumnSum(matrix);
    return0;
}
```

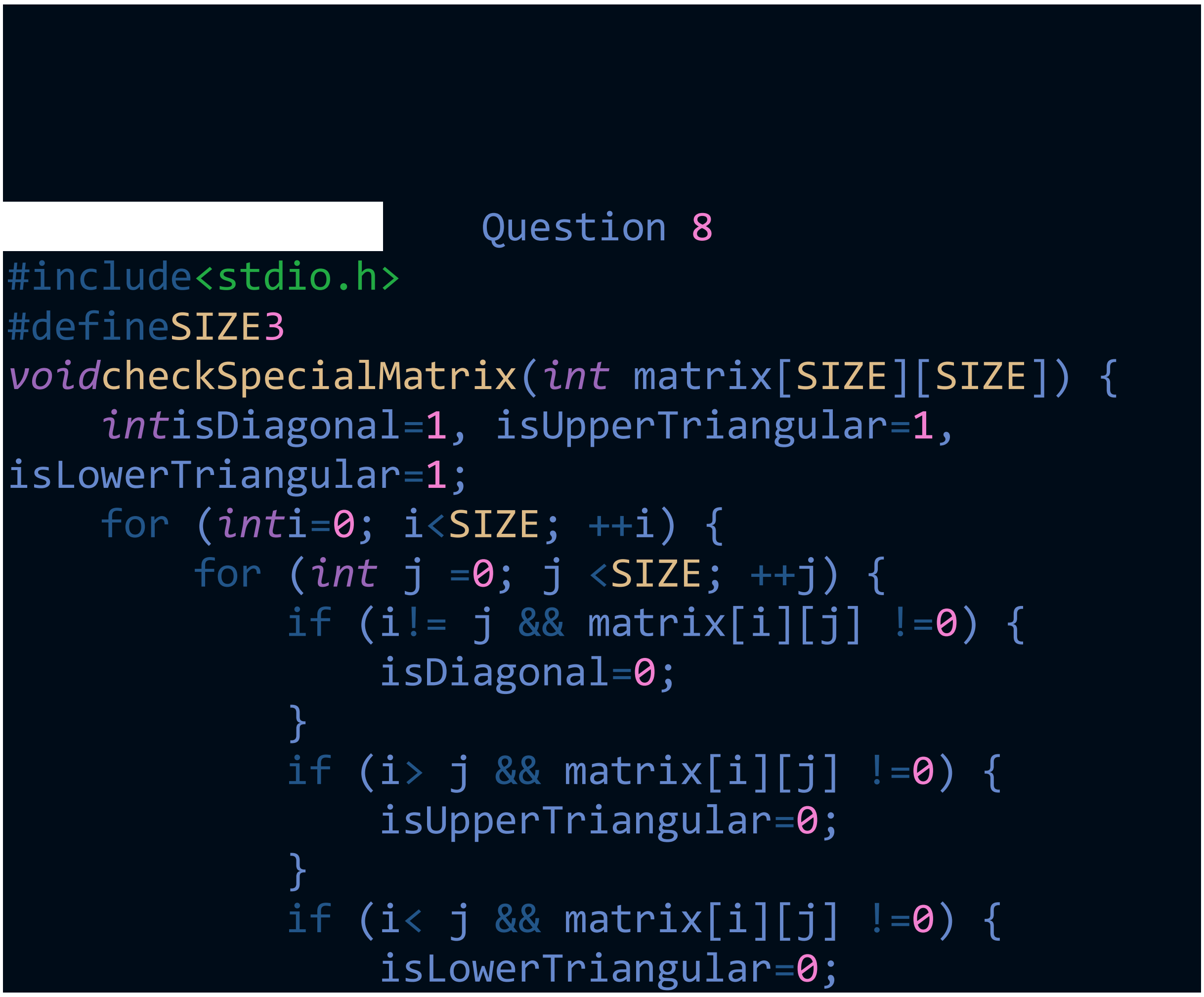
Question 7



```
#include<stdio.h>

intmain() {
    // Initialize a 3x3 matrix
    intmatrix[3][3] = {
        {1, 2, 3},
        {4, 5, 6},
        {7, 8, 9}
```

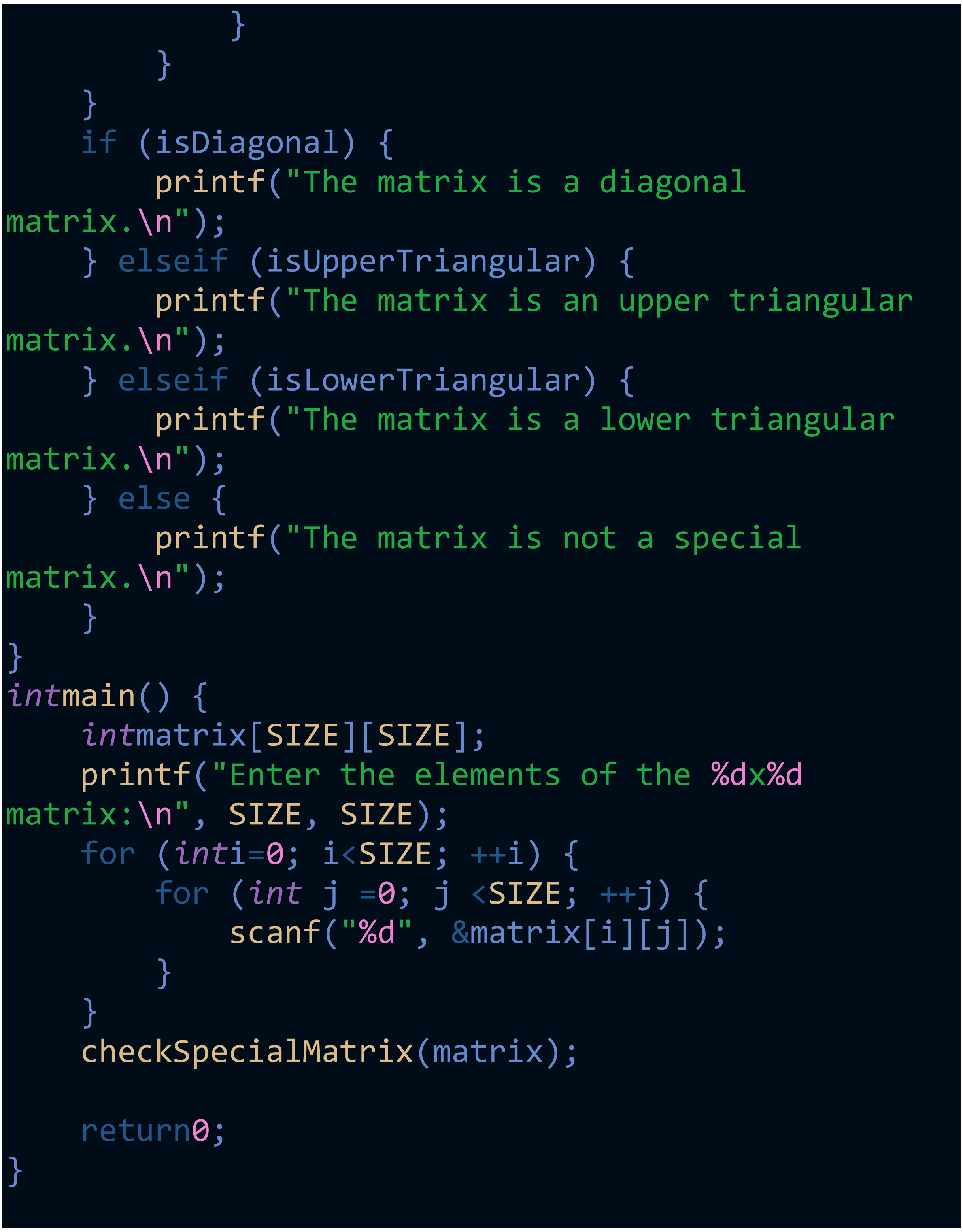


```
    };

    // Print the initialized matrix
    printf("Initialized 3x3 Matrix:\n");
    for (inti=0; i<3; ++i) {
        for (int j =0; j <3; ++j) {
            printf("%d\t", matrix[i][j]);
        }
        printf("\n");
    }

    return0;
}
```



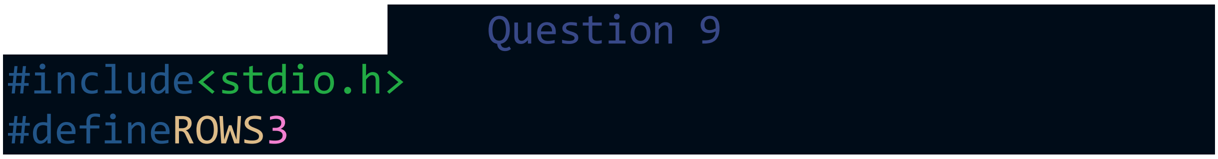
Question 8

```
#include<stdio.h>
#defineSIZE3
voidcheckSpecialMatrix(int matrix[SIZE][SIZE]) {
    intisDiagonal=1, isUpperTriangular=1,
isLowerTriangular=1;
    for (inti=0; i<SIZE; ++i) {
        for (int j =0; j <SIZE; ++j) {
            if (i!= j && matrix[i][j] !=0) {
                isDiagonal=0;
            }
            if (i> j && matrix[i][j] !=0) {
                isUpperTriangular=0;
            }
            if (i< j && matrix[i][j] !=0) {
                isLowerTriangular=0;
```

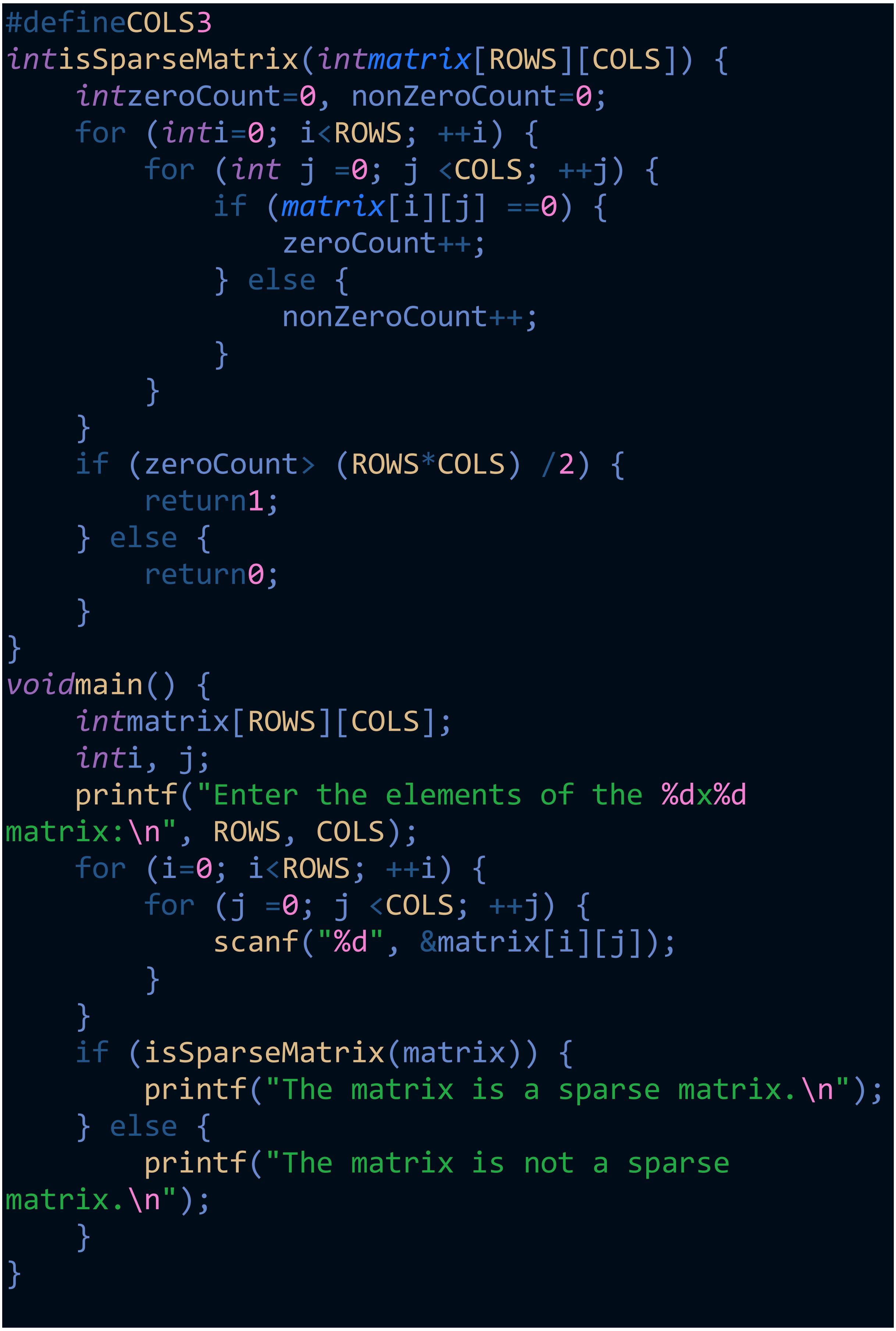


```
            }
        }
    }
    if (isDiagonal) {
        printf("The matrix is a diagonal
matrix.\n");
    } elseif (isUpperTriangular) {
        printf("The matrix is an upper triangular
matrix.\n");
    } elseif (isLowerTriangular) {
        printf("The matrix is a lower triangular
matrix.\n");
    } else {
        printf("The matrix is not a special
matrix.\n");
    }
}
intmain() {
    intmatrix[SIZE][SIZE];
    printf("Enter the elements of the %dx%d
matrix:\n", SIZE, SIZE);
    for (inti=0; i<SIZE; ++i) {
        for (int j =0; j <SIZE; ++j) {
            scanf("%d", &matrix[i][j]);
        }
    }
    checkSpecialMatrix(matrix);

    return0;
}
```

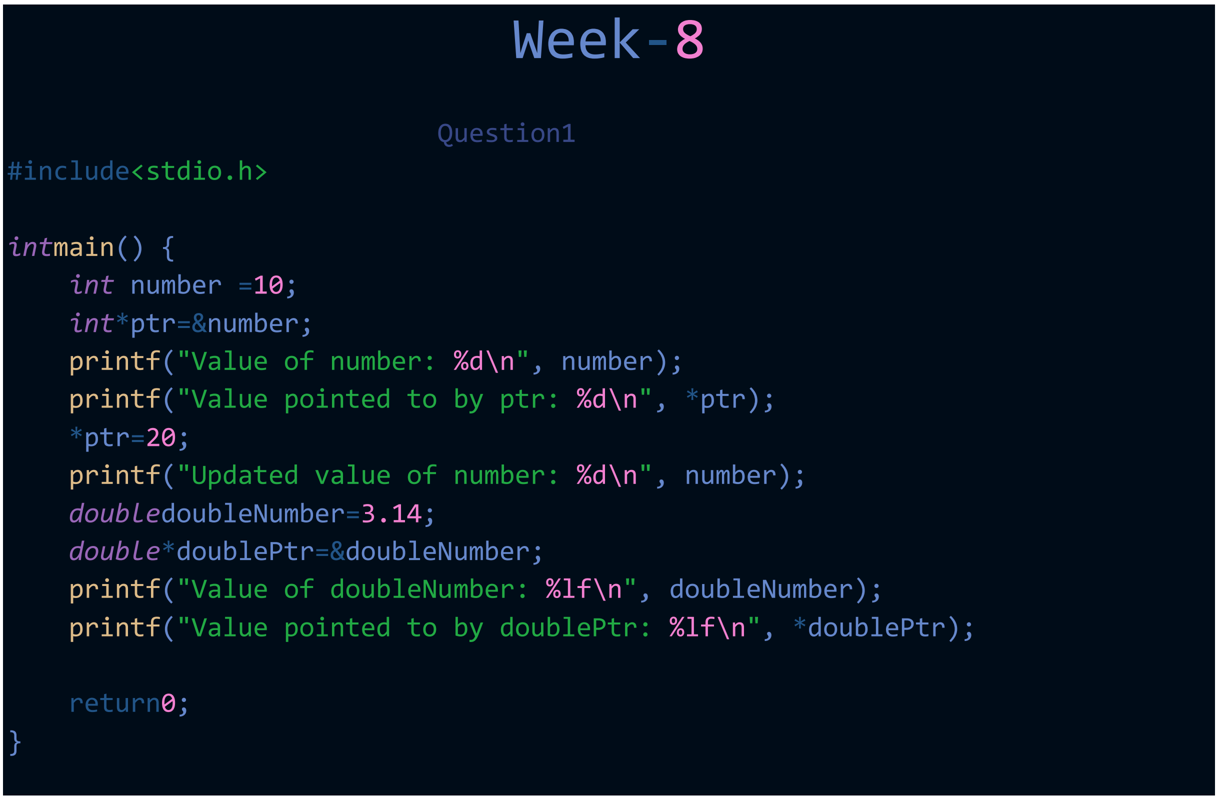
Question 9



```
#include<stdio.h>
#defineROWS3
```



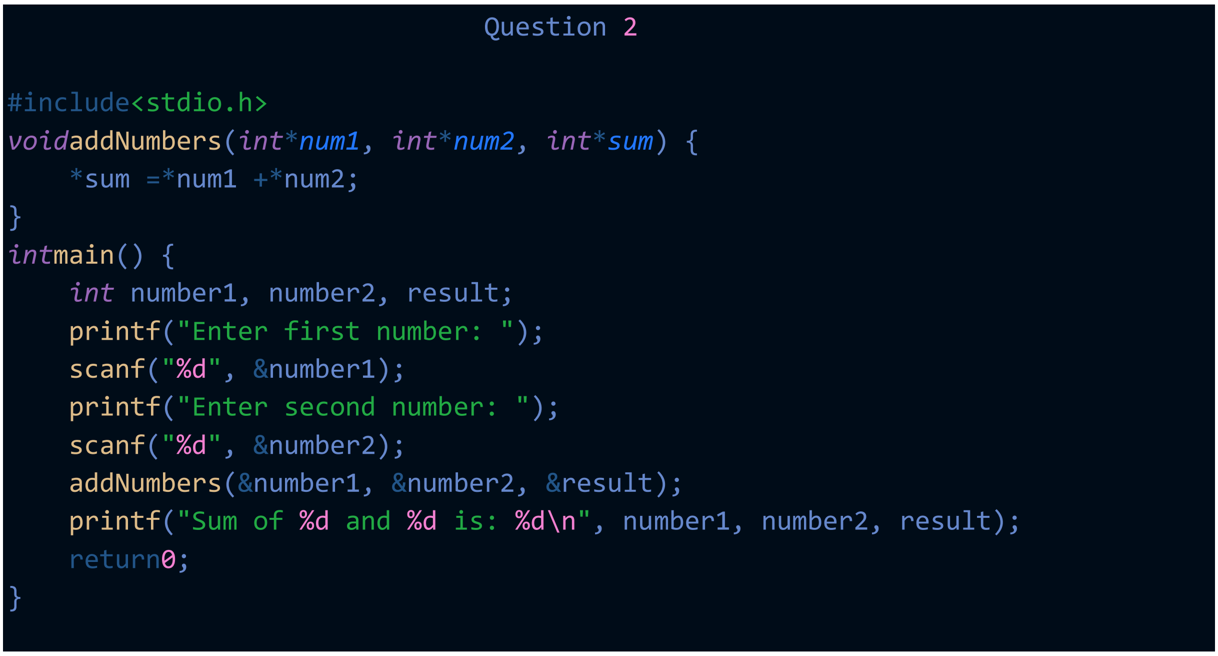
```
#defineCOLS3
intisSparseMatrix(intmatrix[ROWS][COLS]) {
    intzeroCount=0, nonZeroCount=0;
    for (inti=0; i<ROWS; ++i) {
        for (int j =0; j <COLS; ++j) {
            if (matrix[i][j] ==0) {
                zeroCount++;
            } else {
                nonZeroCount++;
            }
        }
    }
    if (zeroCount> (ROWS*COLS) /2) {
        return1;
    } else {
        return0;
    }
}
voidmain() {
    intmatrix[ROWS][COLS];
    inti, j;
    printf("Enter the elements of the %dx%d
matrix:\n", ROWS, COLS);
    for (i=0; i<ROWS; ++i) {
        for (j =0; j <COLS; ++j) {
            scanf("%d", &matrix[i][j]);
        }
    }
    if (isSparseMatrix(matrix)) {
        printf("The matrix is a sparse matrix.\n");
    } else {
        printf("The matrix is not a sparse
matrix.\n");
    }
}
```



Week-8

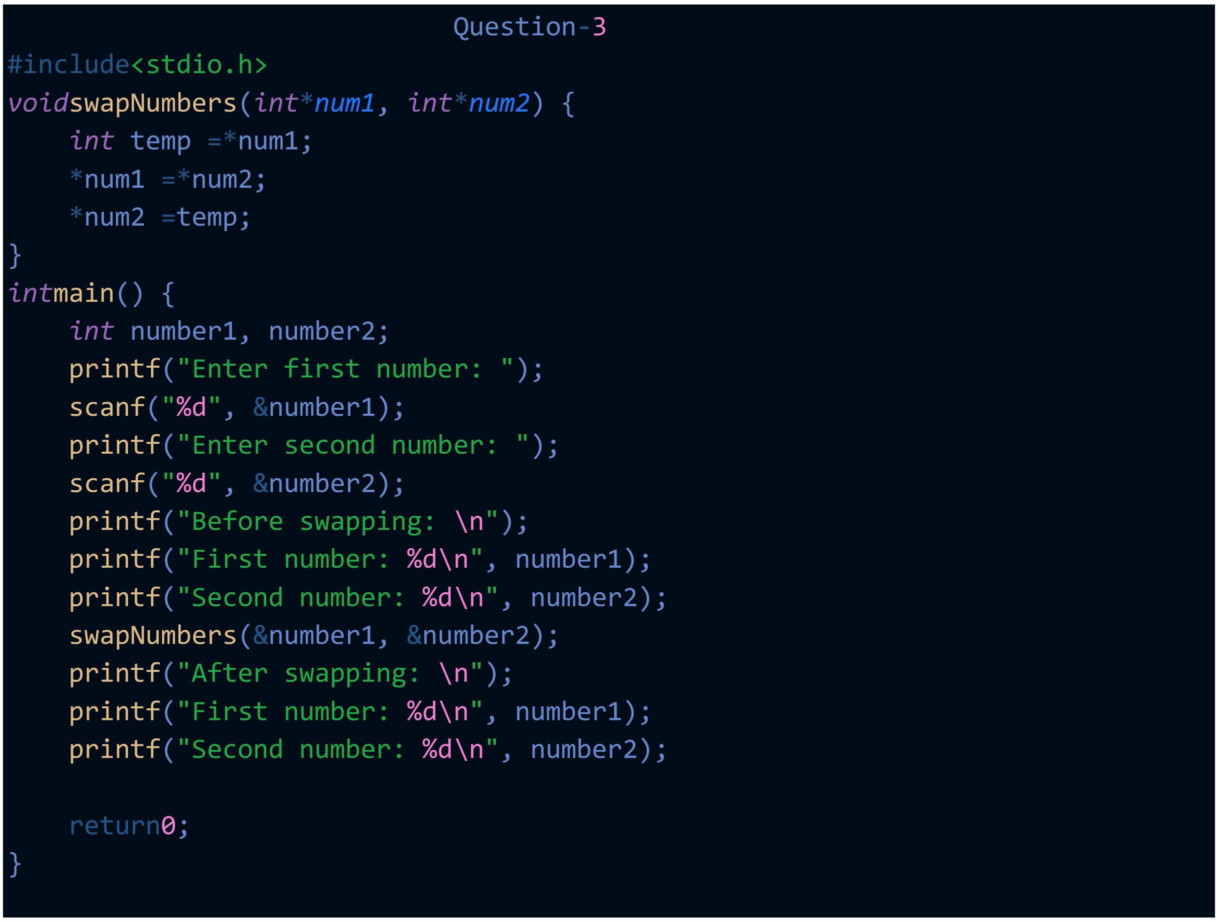
Question1

```c
#include<stdio.h>

intmain() {
    int number =10;
    int*ptr=&number;
    printf("Value of number: %d\n", number);
    printf("Value pointed to by ptr: %d\n", *ptr);
    *ptr=20;
    printf("Updated value of number: %d\n", number);
    doubledoubleNumber=3.14;
    double*doublePtr=&doubleNumber;
    printf("Value of doubleNumber: %lf\n", doubleNumber);
    printf("Value pointed to by doublePtr: %lf\n", *doublePtr);

    return0;
}
```

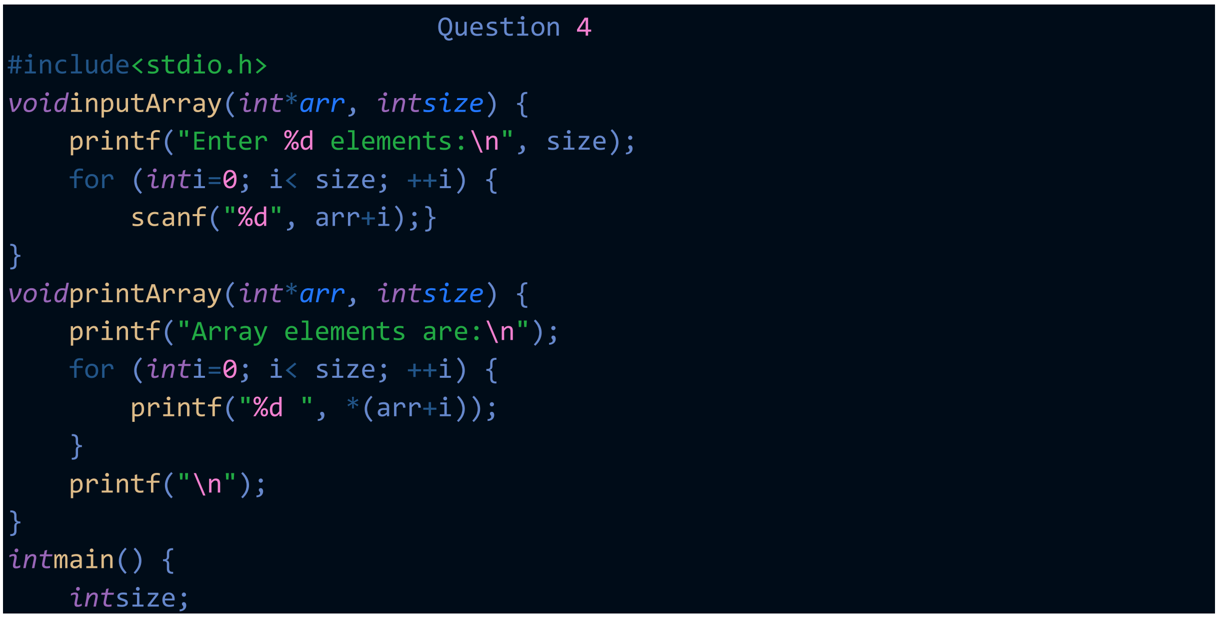


Question 2

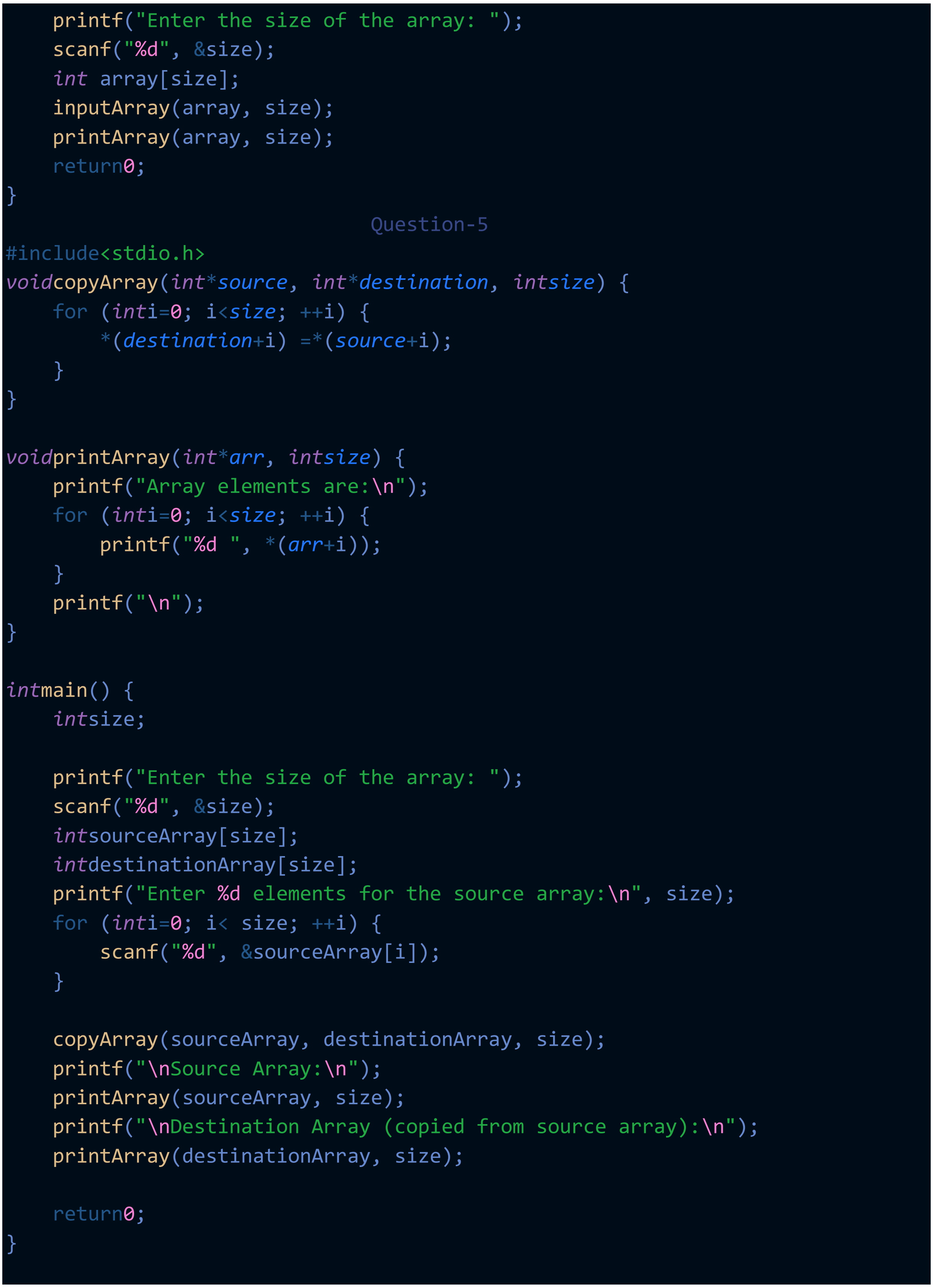
```c
#include<stdio.h>
voidaddNumbers(int*num1, int*num2, int*sum) {
    *sum =*num1 +*num2;
}
intmain() {
    int number1, number2, result;
    printf("Enter first number: ");
    scanf("%d", &number1);
    printf("Enter second number: ");
    scanf("%d", &number2);
    addNumbers(&number1, &number2, &result);
    printf("Sum of %d and %d is: %d\n", number1, number2, result);
    return0;
}
```



```
                              Question-3
#include<stdio.h>
voidswapNumbers(int*num1, int*num2) {
    int temp =*num1;
    *num1 =*num2;
    *num2 =temp;
}
intmain() {
    int number1, number2;
    printf("Enter first number: ");
    scanf("%d", &number1);
    printf("Enter second number: ");
    scanf("%d", &number2);
    printf("Before swapping: \n");
    printf("First number: %d\n", number1);
    printf("Second number: %d\n", number2);
    swapNumbers(&number1, &number2);
    printf("After swapping: \n");
    printf("First number: %d\n", number1);
    printf("Second number: %d\n", number2);

    return0;
}
```



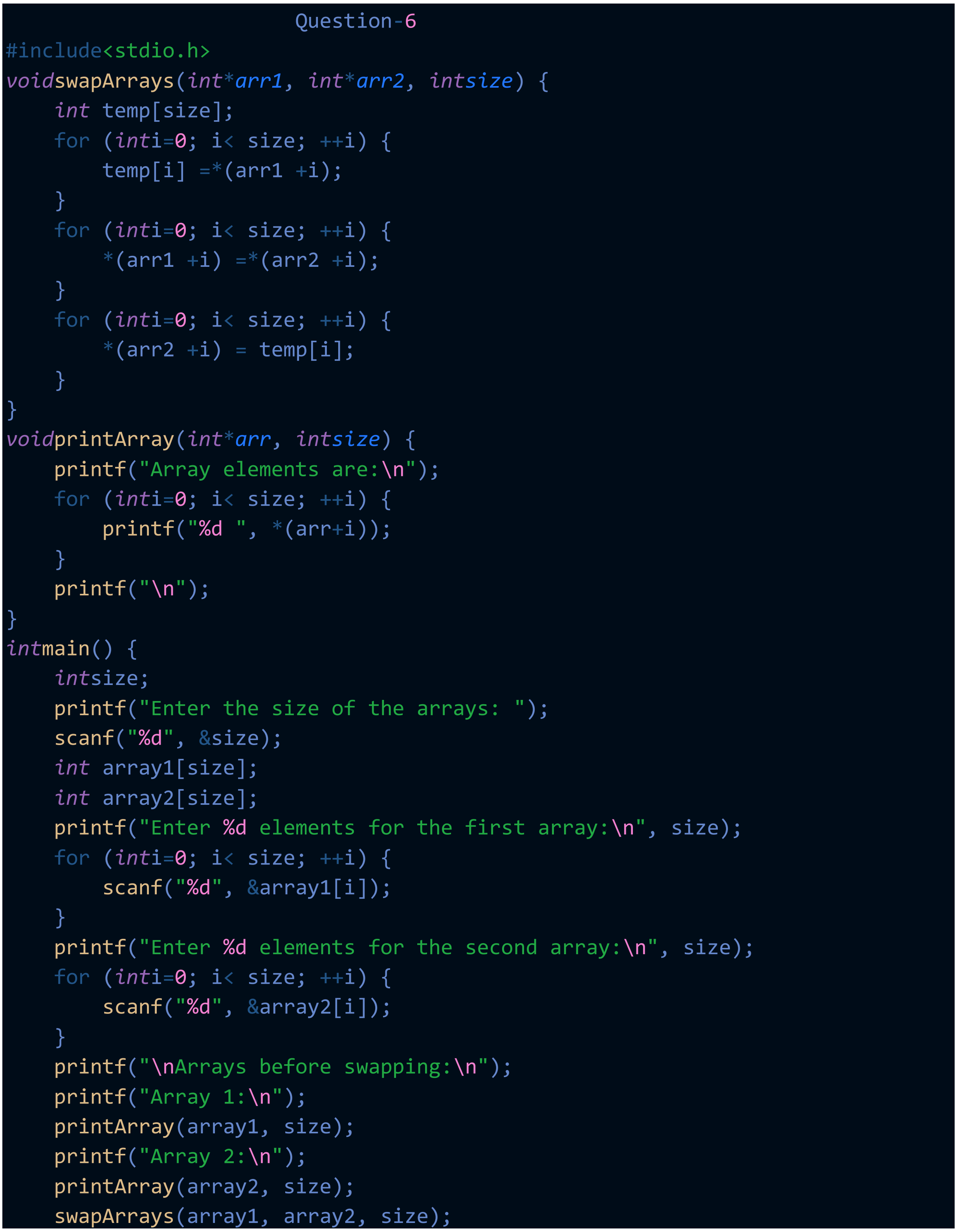
```
                              Question 4
#include<stdio.h>
voidinputArray(int*arr, intsize) {
    printf("Enter %d elements:\n", size);
    for (inti=0; i< size; ++i) {
        scanf("%d", arr+i);}
}
voidprintArray(int*arr, intsize) {
    printf("Array elements are:\n");
    for (inti=0; i< size; ++i) {
        printf("%d ", *(arr+i));
    }
    printf("\n");
}
intmain() {
    intsize;
```



```
    printf("Enter the size of the array: ");
    scanf("%d", &size);
    int array[size];
    inputArray(array, size);
    printArray(array, size);
    return0;
}
```

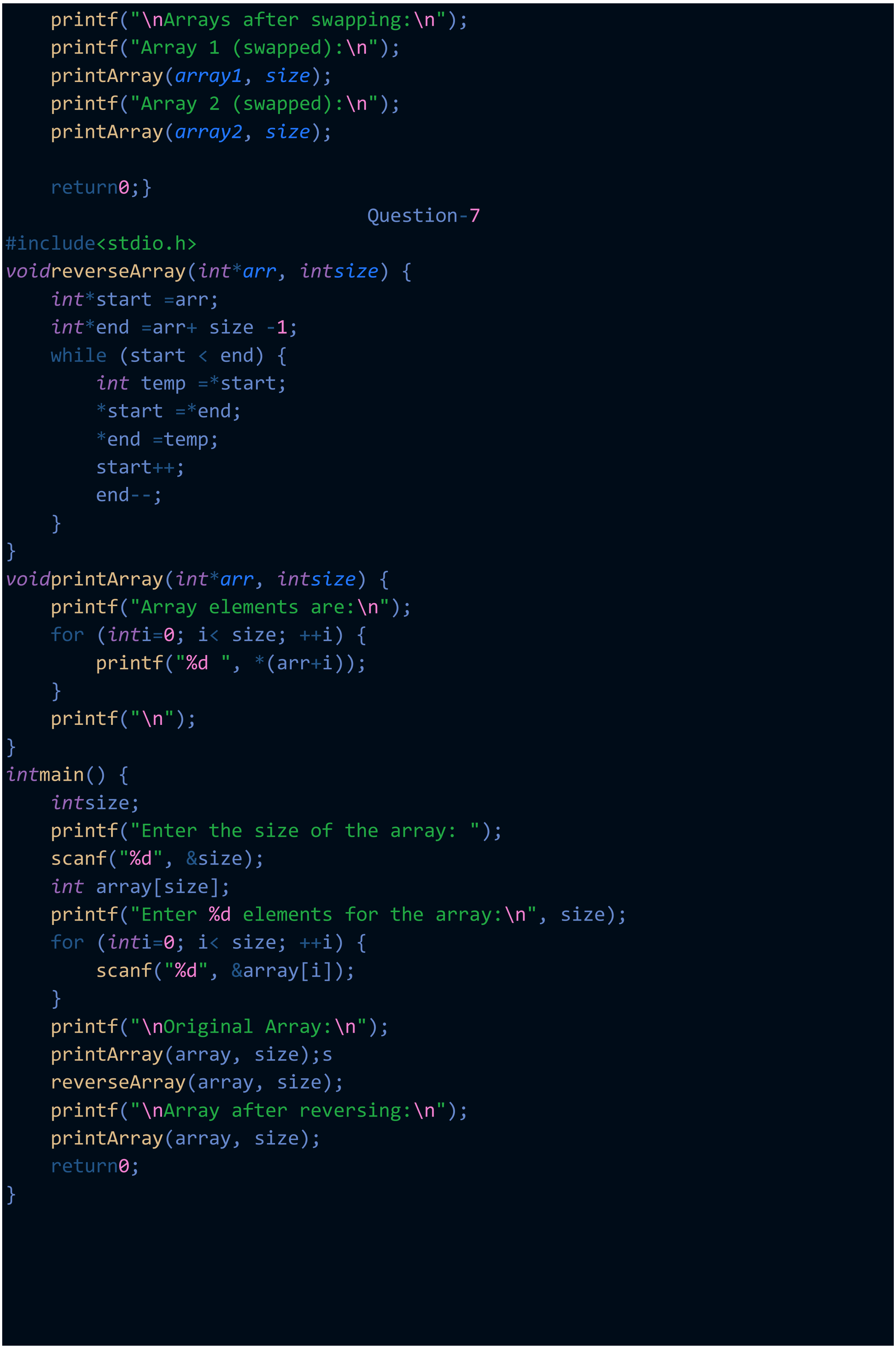
Question-5

```
#include<stdio.h>
voidcopyArray(int*source, int*destination, intsize) {
    for (inti=0; i<size; ++i) {
        *(destination+i) =*(source+i);
    }
}

voidprintArray(int*arr, intsize) {
    printf("Array elements are:\n");
    for (inti=0; i<size; ++i) {
        printf("%d ", *(arr+i));
    }
    printf("\n");
}

intmain() {
    intsize;

    printf("Enter the size of the array: ");
    scanf("%d", &size);
    intsourceArray[size];
    intdestinationArray[size];
    printf("Enter %d elements for the source array:\n", size);
    for (inti=0; i< size; ++i) {
        scanf("%d", &sourceArray[i]);
    }

    copyArray(sourceArray, destinationArray, size);
    printf("\nSource Array:\n");
    printArray(sourceArray, size);
    printf("\nDestination Array (copied from source array):\n");
    printArray(destinationArray, size);

    return0;
}
```



Question-6

```
#include<stdio.h>
voidswapArrays(int*arr1, int*arr2, intsize) {
    int temp[size];
    for (inti=0; i< size; ++i) {
        temp[i] =*(arr1 +i);
    }
    for (inti=0; i< size; ++i) {
        *(arr1 +i) =*(arr2 +i);
    }
    for (inti=0; i< size; ++i) {
        *(arr2 +i) = temp[i];
    }
}
voidprintArray(int*arr, intsize) {
    printf("Array elements are:\n");
    for (inti=0; i< size; ++i) {
        printf("%d ", *(arr+i));
    }
    printf("\n");
}
intmain() {
    intsize;
    printf("Enter the size of the arrays: ");
    scanf("%d", &size);
    int array1[size];
    int array2[size];
    printf("Enter %d elements for the first array:\n", size);
    for (inti=0; i< size; ++i) {
        scanf("%d", &array1[i]);
    }
    printf("Enter %d elements for the second array:\n", size);
    for (inti=0; i< size; ++i) {
        scanf("%d", &array2[i]);
    }
    printf("\nArrays before swapping:\n");
    printf("Array 1:\n");
    printArray(array1, size);
    printf("Array 2:\n");
    printArray(array2, size);
    swapArrays(array1, array2, size);
```



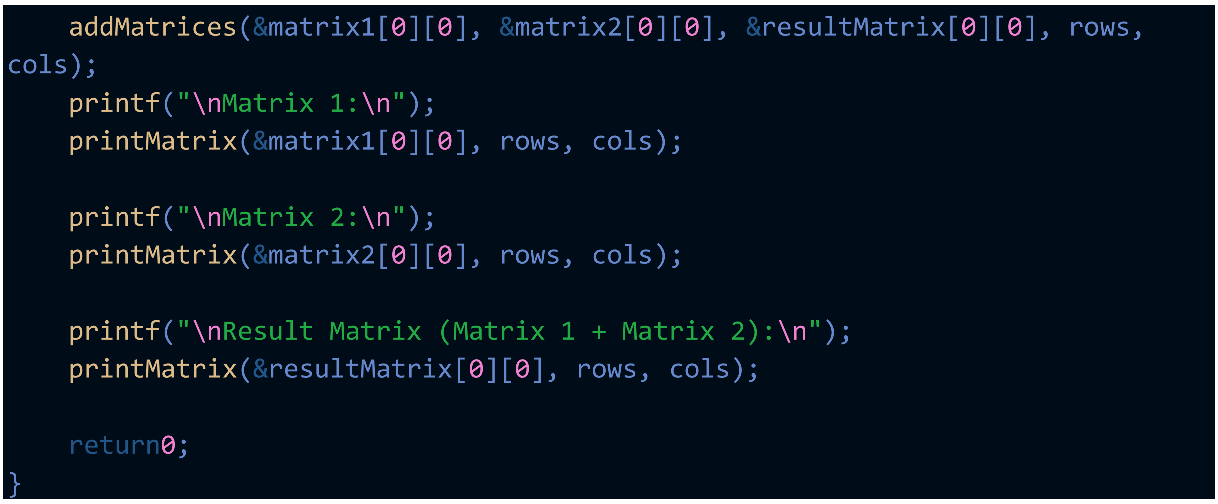
```
    printf("\nArrays after swapping:\n");
    printf("Array 1 (swapped):\n");
    printArray(array1, size);
    printf("Array 2 (swapped):\n");
    printArray(array2, size);

    return0;}
```

Question-7

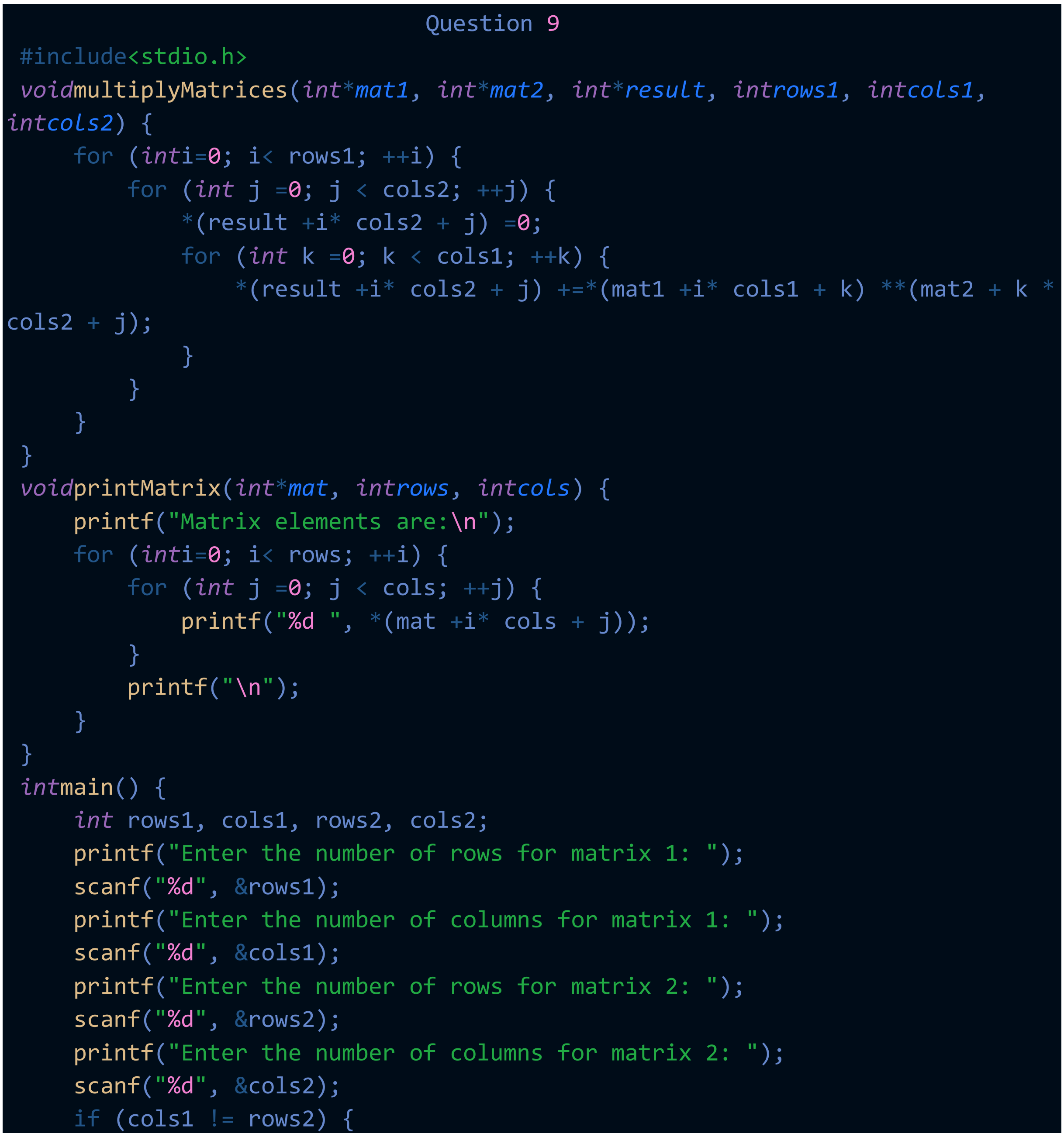
```
#include<stdio.h>
voidreverseArray(int*arr, intsize) {
    int*start =arr;
    int*end =arr+ size -1;
    while (start < end) {
        int temp =*start;
        *start =*end;
        *end =temp;
        start++;
        end--;
    }
}
voidprintArray(int*arr, intsize) {
    printf("Array elements are:\n");
    for (inti=0; i< size; ++i) {
        printf("%d ", *(arr+i));
    }
    printf("\n");
}
intmain() {
    intsize;
    printf("Enter the size of the array: ");
    scanf("%d", &size);
    int array[size];
    printf("Enter %d elements for the array:\n", size);
    for (inti=0; i< size; ++i) {
        scanf("%d", &array[i]);
    }
    printf("\nOriginal Array:\n");
    printArray(array, size);s
    reverseArray(array, size);
    printf("\nArray after reversing:\n");
    printArray(array, size);
    return0;
}
```

Question 8

```
#include<stdio.h>
voidaddMatrices(int*mat1, int*mat2, int*result, introws, intcols) {
    for (inti=0; i< rows; ++i) {
        for (int j =0; j < cols; ++j) {
            *(result +i* cols + j) =*(mat1 +i* cols + j) +*(mat2 +i* cols +
j);
        }
    }
}
voidprintMatrix(int*mat, introws, intcols) {
    printf("Matrix elements are:\n");
    for (inti=0; i< rows; ++i) {
        for (int j =0; j < cols; ++j) {
            printf("%d ", *(mat +i* cols + j));
        }
        printf("\n");
    }
}
intmain() {
    int rows, cols;
    printf("Enter the number of rows: ");
    scanf("%d", &rows);

    printf("Enter the number of columns: ");
    scanf("%d", &cols);
    int matrix1[rows][cols];
    int matrix2[rows][cols];
    intresultMatrix[rows][cols];
    printf("Enter elements for the first matrix:\n");
    for (inti=0; i< rows; ++i) {
        for (int j =0; j < cols; ++j) {
            scanf("%d", &matrix1[i][j]);
        }
    }
    printf("Enter elements for the second matrix:\n");
    for (inti=0; i< rows; ++i) {
        for (int j =0; j < cols; ++j) {
            scanf("%d", &matrix2[i][j]);
        }
    }
```

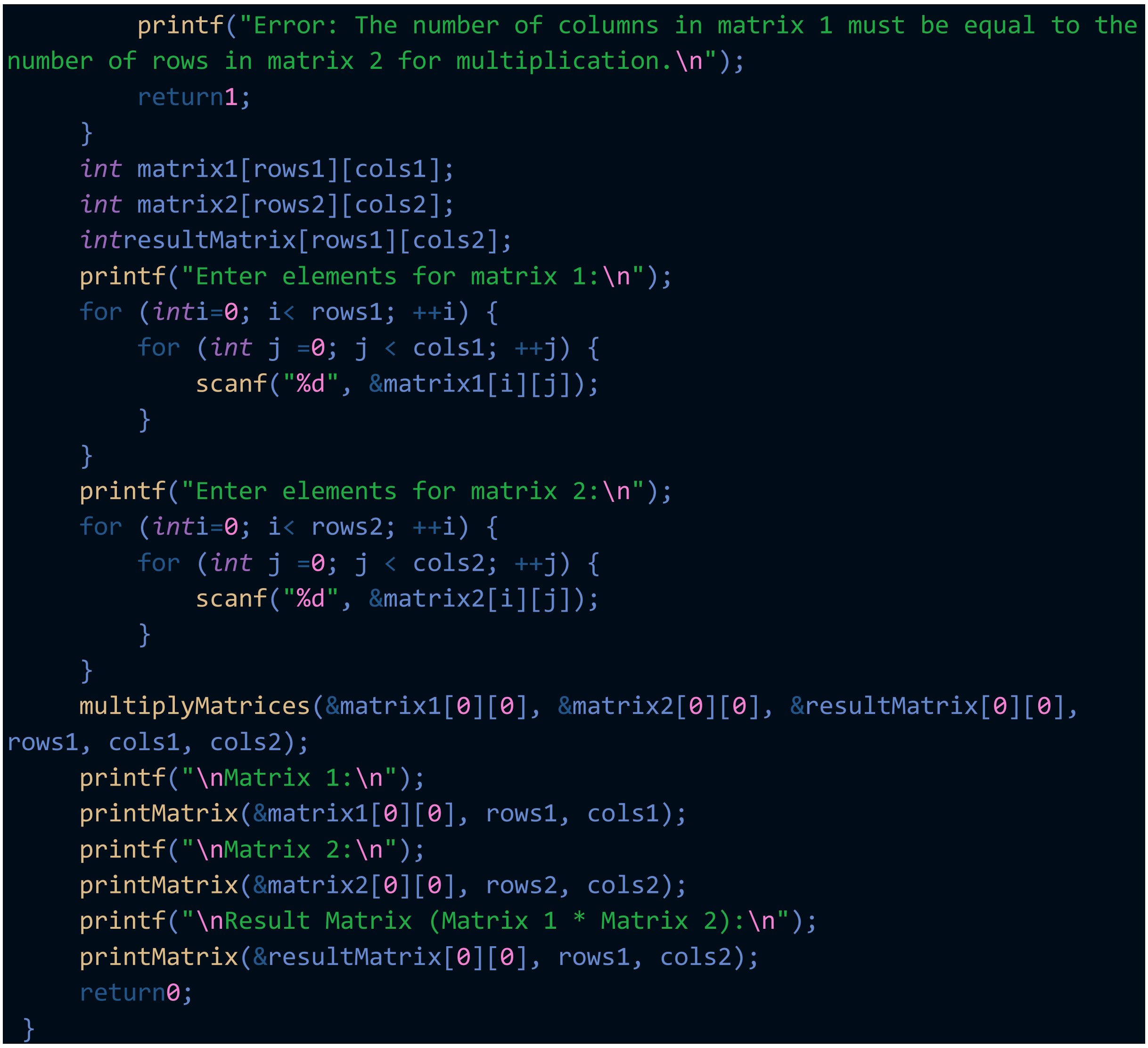


```
    addMatrices(&matrix1[0][0], &matrix2[0][0], &resultMatrix[0][0], rows,
cols);
    printf("\nMatrix 1:\n");
    printMatrix(&matrix1[0][0], rows, cols);

    printf("\nMatrix 2:\n");
    printMatrix(&matrix2[0][0], rows, cols);

    printf("\nResult Matrix (Matrix 1 + Matrix 2):\n");
    printMatrix(&resultMatrix[0][0], rows, cols);

    return0;
}
```



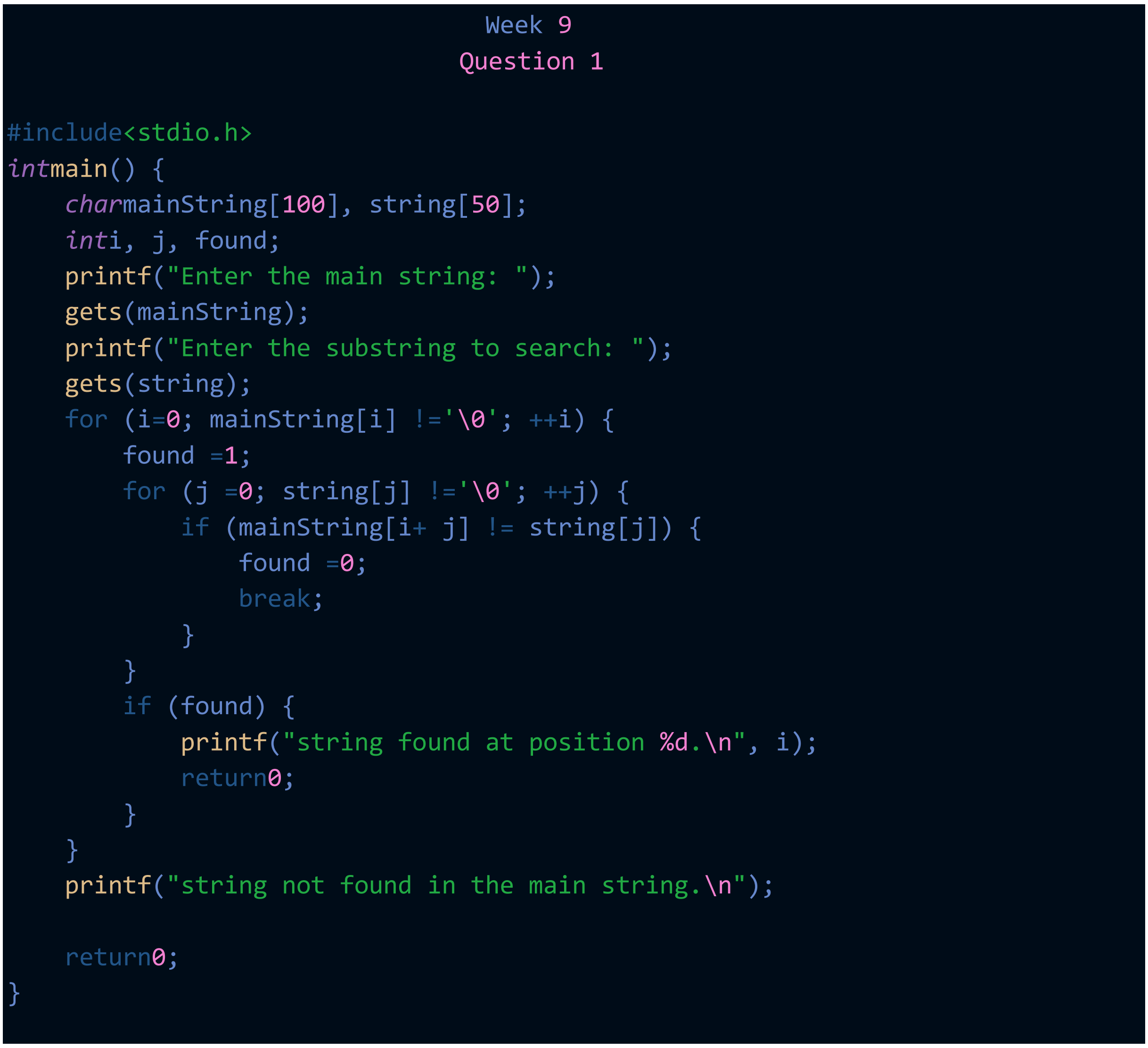
Question 9

```
 #include<stdio.h>
 voidmultiplyMatrices(int*mat1, int*mat2, int*result, introws1, intcols1,
intcols2) {
     for (inti=0; i< rows1; ++i) {
         for (int j =0; j < cols2; ++j) {
             *(result +i* cols2 + j) =0;
             for (int k =0; k < cols1; ++k) {
                 *(result +i* cols2 + j) +=*(mat1 +i* cols1 + k) **(mat2 + k *
cols2 + j);
             }
         }
     }
 }
 voidprintMatrix(int*mat, introws, intcols) {
     printf("Matrix elements are:\n");
     for (inti=0; i< rows; ++i) {
         for (int j =0; j < cols; ++j) {
             printf("%d ", *(mat +i* cols + j));
         }
         printf("\n");
     }
 }
 intmain() {
     int rows1, cols1, rows2, cols2;
     printf("Enter the number of rows for matrix 1: ");
     scanf("%d", &rows1);
     printf("Enter the number of columns for matrix 1: ");
     scanf("%d", &cols1);
     printf("Enter the number of rows for matrix 2: ");
     scanf("%d", &rows2);
     printf("Enter the number of columns for matrix 2: ");
     scanf("%d", &cols2);
     if (cols1 != rows2) {
```



```
        printf("Error: The number of columns in matrix 1 must be equal to the
number of rows in matrix 2 for multiplication.\n");
        return1;
    }
    int matrix1[rows1][cols1];
    int matrix2[rows2][cols2];
    intresultMatrix[rows1][cols2];
    printf("Enter elements for matrix 1:\n");
    for (inti=0; i< rows1; ++i) {
        for (int j =0; j < cols1; ++j) {
            scanf("%d", &matrix1[i][j]);
        }
    }
    printf("Enter elements for matrix 2:\n");
    for (inti=0; i< rows2; ++i) {
        for (int j =0; j < cols2; ++j) {
            scanf("%d", &matrix2[i][j]);
        }
    }
    multiplyMatrices(&matrix1[0][0], &matrix2[0][0], &resultMatrix[0][0],
rows1, cols1, cols2);
    printf("\nMatrix 1:\n");
    printMatrix(&matrix1[0][0], rows1, cols1);
    printf("\nMatrix 2:\n");
    printMatrix(&matrix2[0][0], rows2, cols2);
    printf("\nResult Matrix (Matrix 1 * Matrix 2):\n");
    printMatrix(&resultMatrix[0][0], rows1, cols2);
    return0;
 }
```

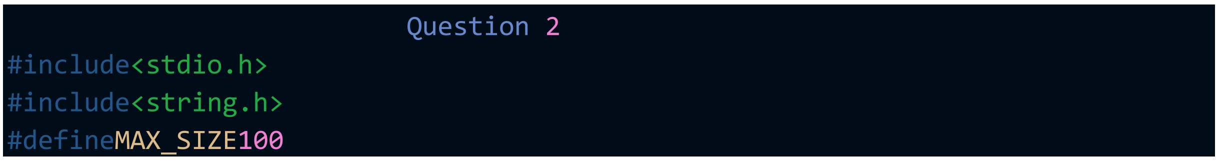
Week 9



Week 9

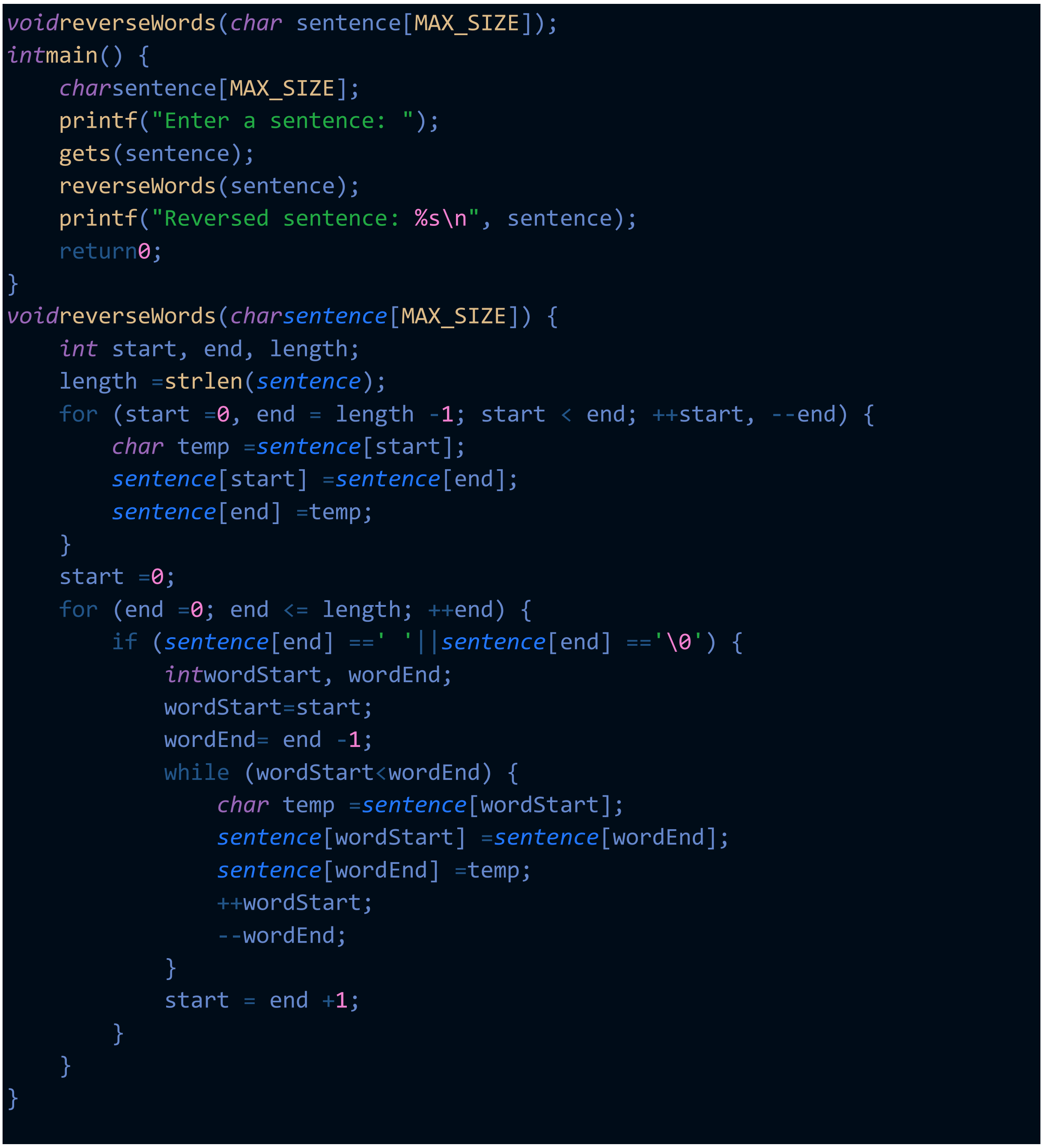
Question 1

```
#include<stdio.h>
intmain() {
    charmainString[100], string[50];
    inti, j, found;
    printf("Enter the main string: ");
    gets(mainString);
    printf("Enter the substring to search: ");
    gets(string);
    for (i=0; mainString[i] !='\0'; ++i) {
        found =1;
        for (j =0; string[j] !='\0'; ++j) {
            if (mainString[i+ j] != string[j]) {
                found =0;
                break;
            }
        }
        if (found) {
            printf("string found at position %d.\n", i);
            return0;
        }
    }
    printf("string not found in the main string.\n");

    return0;
}
```

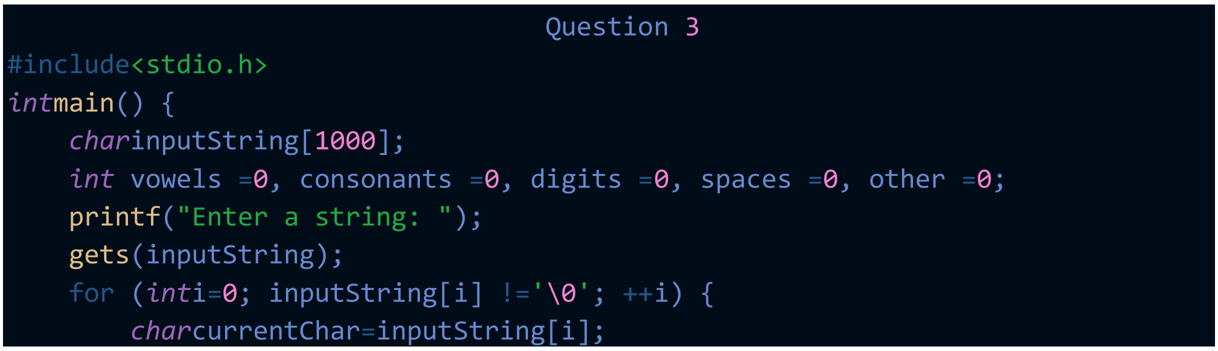


Question 2

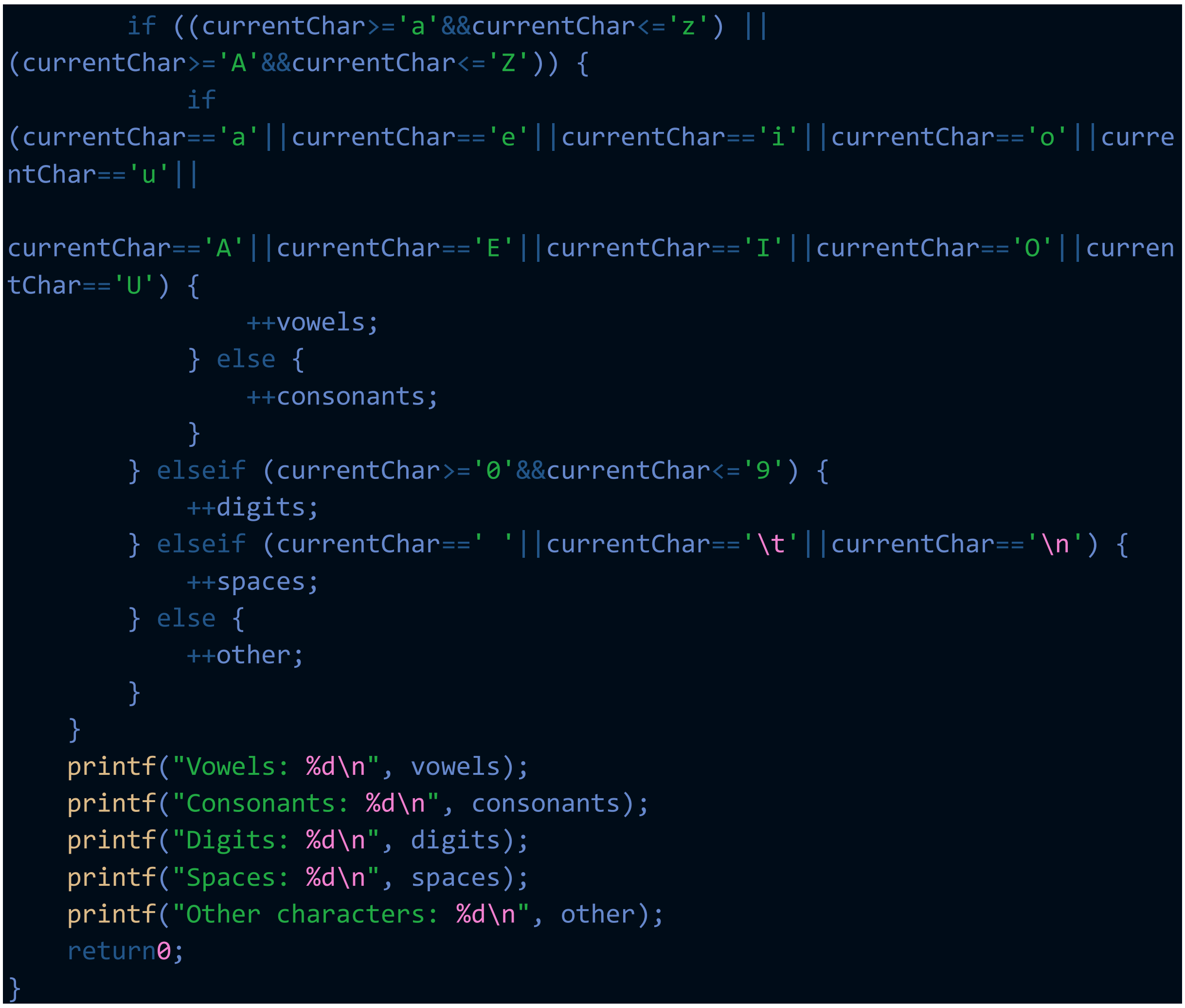
```
#include<stdio.h>
#include<string.h>
#defineMAX_SIZE100
```



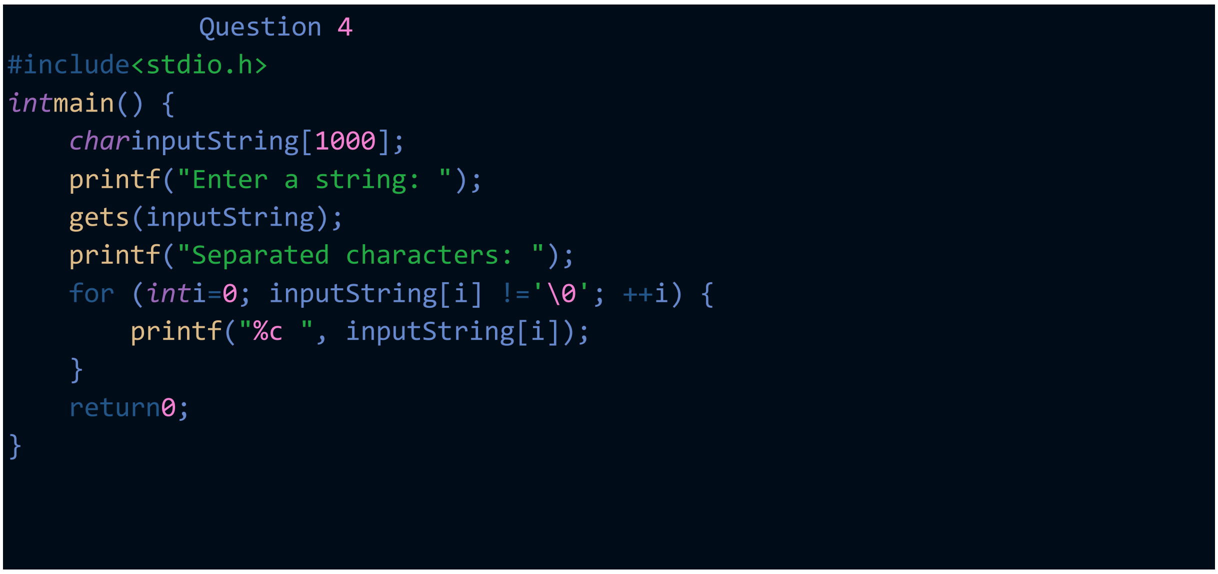
```c
voidreverseWords(char sentence[MAX_SIZE]);
intmain() {
    charsentence[MAX_SIZE];
    printf("Enter a sentence: ");
    gets(sentence);
    reverseWords(sentence);
    printf("Reversed sentence: %s\n", sentence);
    return0;
}
voidreverseWords(charsentence[MAX_SIZE]) {
    int start, end, length;
    length =strlen(sentence);
    for (start =0, end = length -1; start < end; ++start, --end) {
        char temp =sentence[start];
        sentence[start] =sentence[end];
        sentence[end] =temp;
    }
    start =0;
    for (end =0; end <= length; ++end) {
        if (sentence[end] ==' '||sentence[end] =='\0') {
            intwordStart, wordEnd;
            wordStart=start;
            wordEnd= end -1;
            while (wordStart<wordEnd) {
                char temp =sentence[wordStart];
                sentence[wordStart] =sentence[wordEnd];
                sentence[wordEnd] =temp;
                ++wordStart;
                --wordEnd;
            }
            start = end +1;
        }
    }
}
```



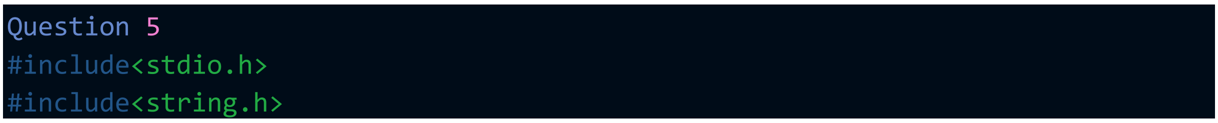
```c
                                    Question 3
#include<stdio.h>
intmain() {
    charinputString[1000];
    int vowels =0, consonants =0, digits =0, spaces =0, other =0;
    printf("Enter a string: ");
    gets(inputString);
    for (inti=0; inputString[i] !='\0'; ++i) {
        charcurrentChar=inputString[i];
```



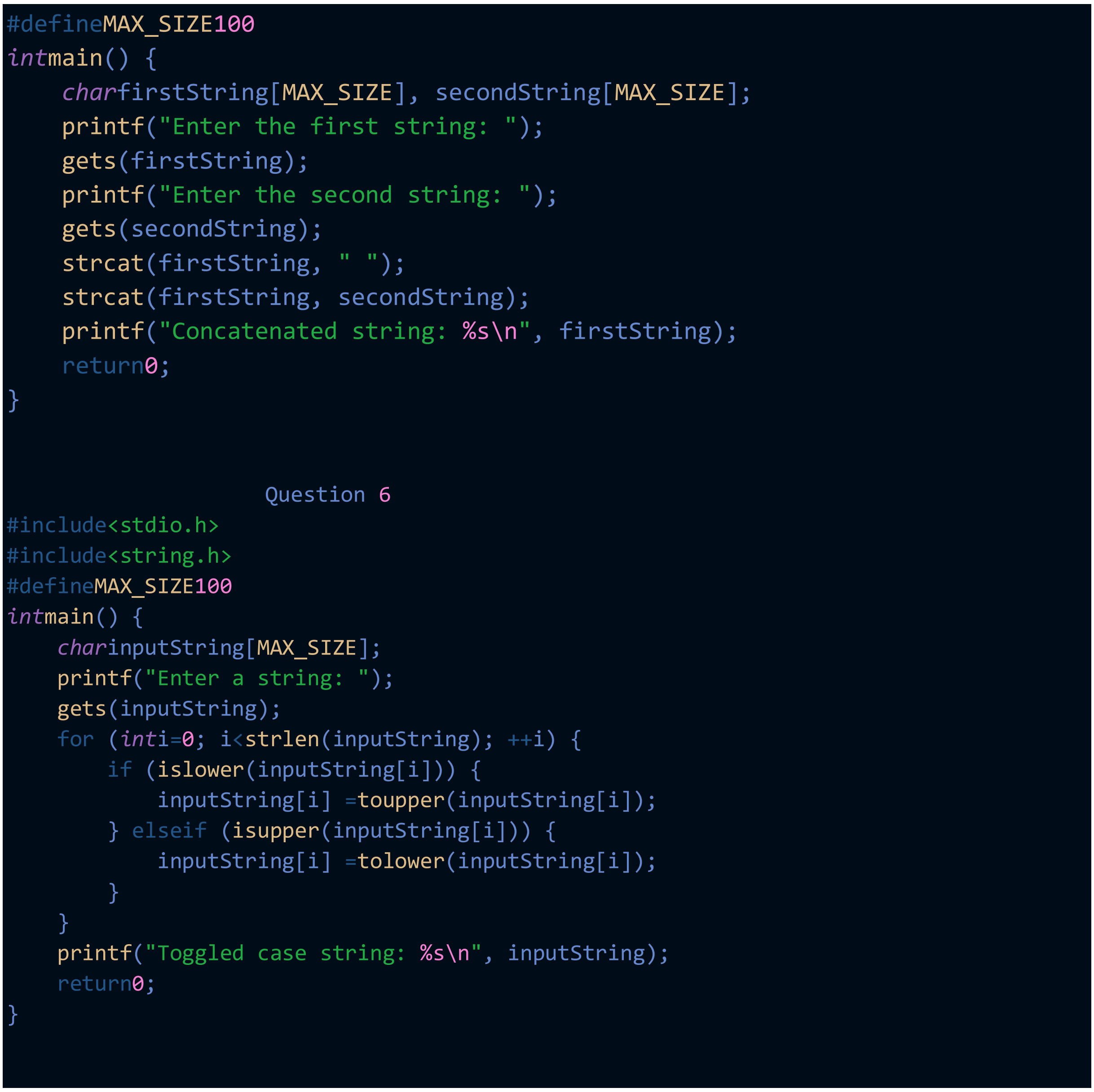
```
        if ((currentChar>='a'&&currentChar<='z') ||
(currentChar>='A'&&currentChar<='Z')) {
            if
(currentChar=='a'||currentChar=='e'||currentChar=='i'||currentChar=='o'||curre
ntChar=='u'||

currentChar=='A'||currentChar=='E'||currentChar=='I'||currentChar=='O'||curren
tChar=='U') {
                ++vowels;
            } else {
                ++consonants;
            }
        } elseif (currentChar>='0'&&currentChar<='9') {
            ++digits;
        } elseif (currentChar==' '||currentChar=='\t'||currentChar=='\n') {
            ++spaces;
        } else {
            ++other;
        }
    }
    printf("Vowels: %d\n", vowels);
    printf("Consonants: %d\n", consonants);
    printf("Digits: %d\n", digits);
    printf("Spaces: %d\n", spaces);
    printf("Other characters: %d\n", other);
    return0;
}
```



```
            Question 4
#include<stdio.h>
intmain() {
    charinputString[1000];
    printf("Enter a string: ");
    gets(inputString);
    printf("Separated characters: ");
    for (inti=0; inputString[i] !='\0'; ++i) {
        printf("%c ", inputString[i]);
    }
    return0;
}
```



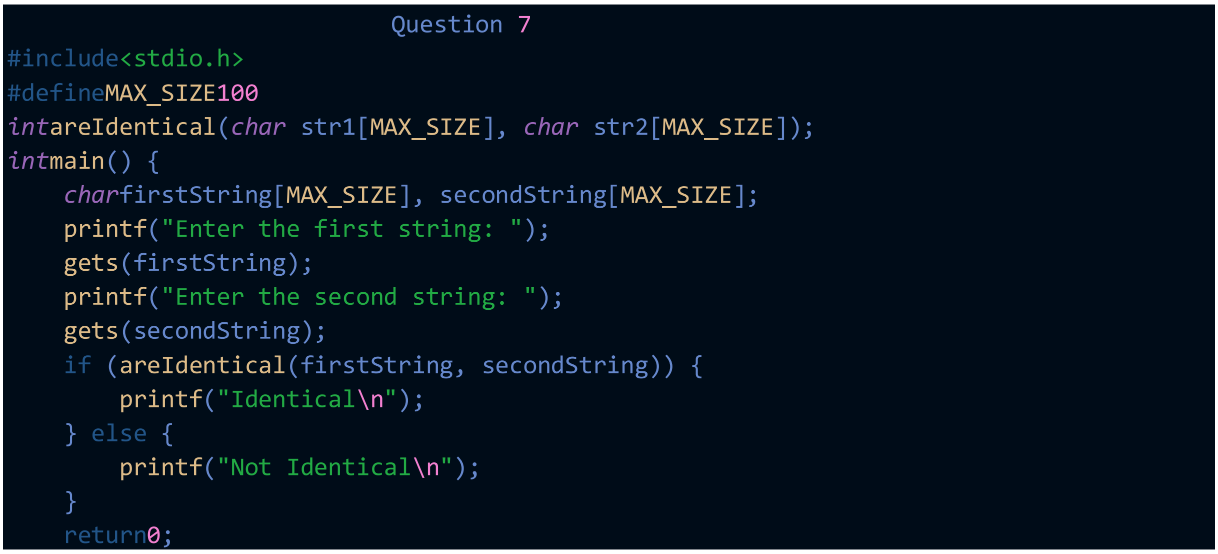
```
Question 5
#include<stdio.h>
#include<string.h>
```



```
#defineMAX_SIZE100
intmain() {
    charfirstString[MAX_SIZE], secondString[MAX_SIZE];
    printf("Enter the first string: ");
    gets(firstString);
    printf("Enter the second string: ");
    gets(secondString);
    strcat(firstString, " ");
    strcat(firstString, secondString);
    printf("Concatenated string: %s\n", firstString);
    return0;
}
```

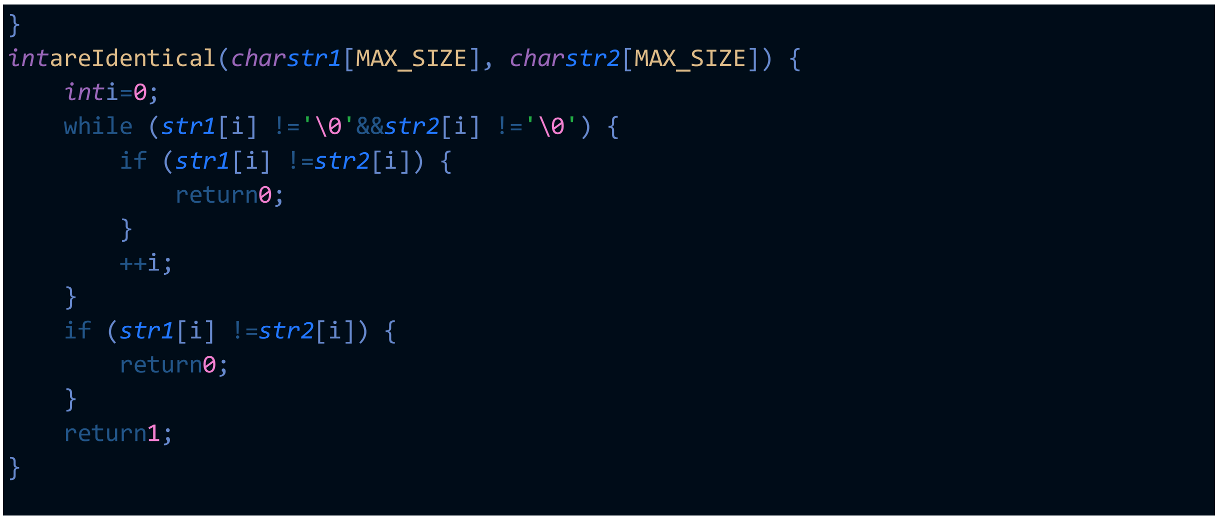
Question 6

```
#include<stdio.h>
#include<string.h>
#defineMAX_SIZE100
intmain() {
    charinputString[MAX_SIZE];
    printf("Enter a string: ");
    gets(inputString);
    for (inti=0; i<strlen(inputString); ++i) {
        if (islower(inputString[i])) {
            inputString[i] =toupper(inputString[i]);
        } elseif (isupper(inputString[i])) {
            inputString[i] =tolower(inputString[i]);
        }
    }
    printf("Toggled case string: %s\n", inputString);
    return0;
}
```

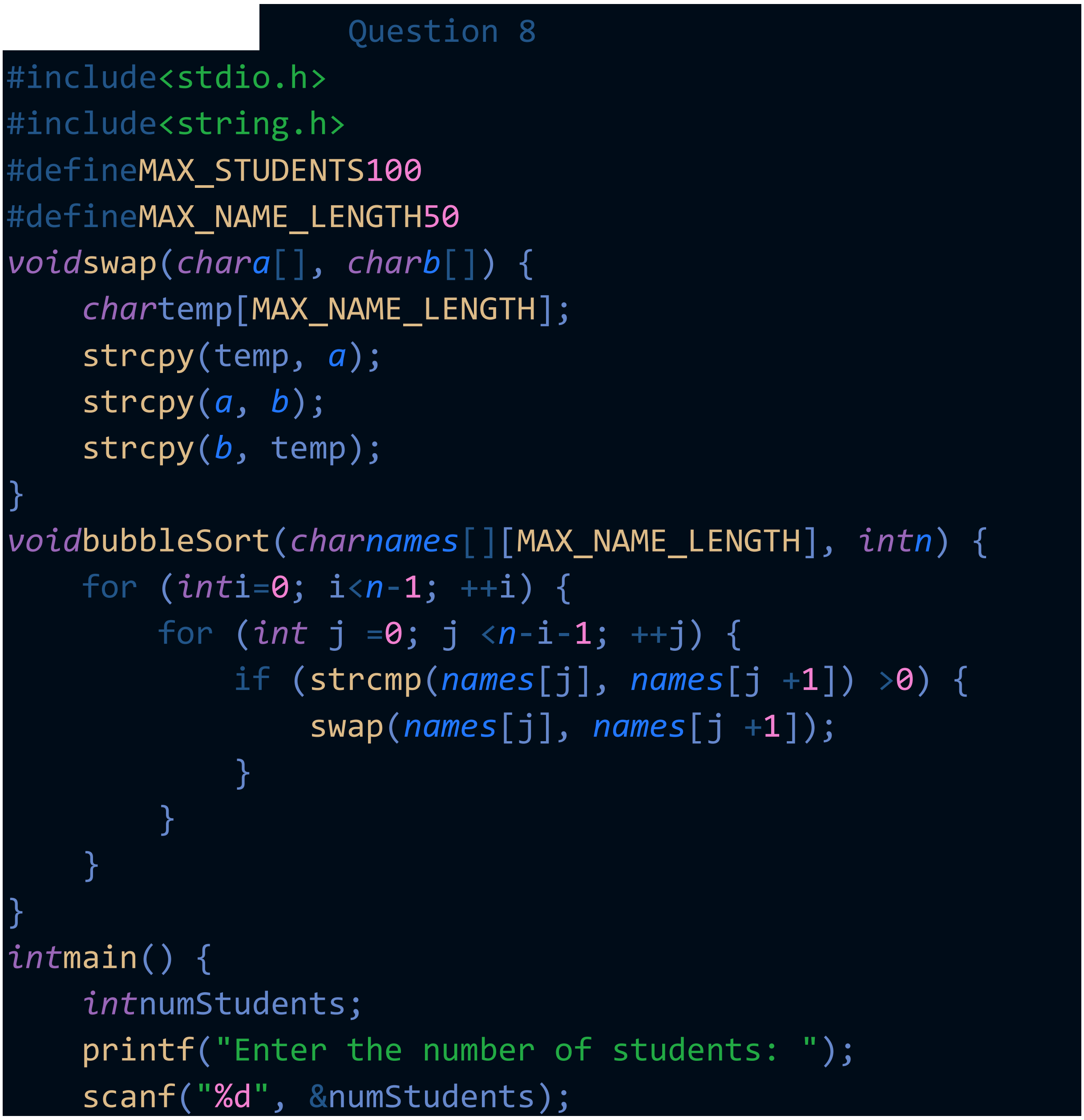


Question 7

```
#include<stdio.h>
#defineMAX_SIZE100
intareIdentical(char str1[MAX_SIZE], char str2[MAX_SIZE]);
intmain() {
    charfirstString[MAX_SIZE], secondString[MAX_SIZE];
    printf("Enter the first string: ");
    gets(firstString);
    printf("Enter the second string: ");
    gets(secondString);
    if (areIdentical(firstString, secondString)) {
        printf("Identical\n");
    } else {
        printf("Not Identical\n");
    }
    return0;
```

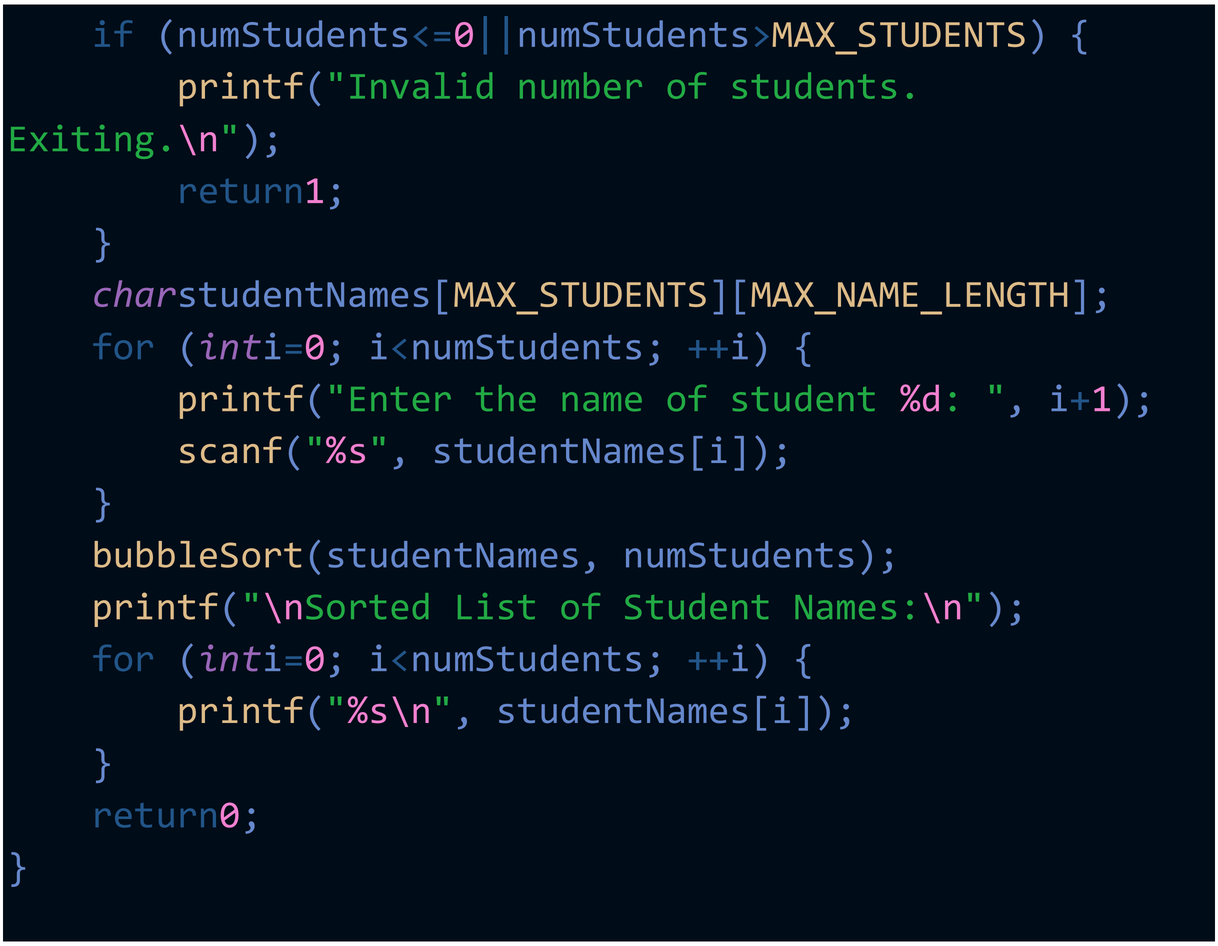


```
}
intareIdentical(charstr1[MAX_SIZE], charstr2[MAX_SIZE]) {
    inti=0;
    while (str1[i] !='\0'&&str2[i] !='\0') {
        if (str1[i] !=str2[i]) {
            return0;
        }
        ++i;
    }
    if (str1[i] !=str2[i]) {
        return0;
    }
    return1;
}
```



Question 8

```
#include<stdio.h>
#include<string.h>
#defineMAX_STUDENTS100
#defineMAX_NAME_LENGTH50
voidswap(chara[], charb[]) {
    chartemp[MAX_NAME_LENGTH];
    strcpy(temp, a);
    strcpy(a, b);
    strcpy(b, temp);
}
voidbubbleSort(charnames[][MAX_NAME_LENGTH], intn) {
    for (inti=0; i<n-1; ++i) {
        for (int j =0; j <n-i-1; ++j) {
            if (strcmp(names[j], names[j +1]) >0) {
                swap(names[j], names[j +1]);
            }
        }
    }
}
intmain() {
    intnumStudents;
    printf("Enter the number of students: ");
    scanf("%d", &numStudents);
```



```
    if (numStudents<=0||numStudents>MAX_STUDENTS) {
        printf("Invalid number of students.
Exiting.\n");
        return1;
    }
    charstudentNames[MAX_STUDENTS][MAX_NAME_LENGTH];
    for (inti=0; i<numStudents; ++i) {
        printf("Enter the name of student %d: ", i+1);
        scanf("%s", studentNames[i]);
    }
    bubbleSort(studentNames, numStudents);
    printf("\nSorted List of Student Names:\n");
    for (inti=0; i<numStudents; ++i) {
        printf("%s\n", studentNames[i]);
    }
    return0;
}
```

9.Write a C program to multiply two matrix using pointers.

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

int main() {
  int n, m, p;
printf("Enter the number of rows in the first matrix: ");
scanf("%d", &n);
printf("Enter the number of columns in the first matrix (and rows in the second
matrix): ");
scanf("%d", &m);
printf("Enter the number of columns in the second matrix: ");
scanf("%d", &p);
  int *A = (int*)malloc(n * m * sizeof(int));
  int *B = (int*)malloc(m * p * sizeof(int));
  int *C = (int*)malloc(n * p * sizeof(int));
  if (!A || !B || !C) {
printf("Error: Memory allocation failed.\n");
exit(1);
  }
printf("Enter elements of the first matrix:\n");
  for (int i = 0; i< n; ++i) {
    for (int j = 0; j < m; ++j) {
printf("Enter element [%d][%d]: ", i + 1, j + 1);
scanf("%d", A + i * m + j);
    }
  }
printf("Enter elements of the second matrix:\n");
  for (int i = 0; i< m; ++i) {
    for (int j = 0; j < p; ++j) {
printf("Enter element [%d][%d]: ", i + 1, j + 1);
scanf("%d", B + i * p + j);
    }
  }
  for (int i = 0; i< n; ++i) {
    for (int j = 0; j < p; ++j) {
      int sum = 0;
      for (int k = 0; k < m; ++k) {
        sum += *(A + i * m + k) * *(B + k * p + j);
      }
      *(C + i * p + j) = sum;
    }
  }
printf("Resultant matrix:\n");
  for (int i = 0; i< n; ++i) {
    for (int j = 0; j < p; ++j) {
printf("%d ", *(C + i * p + j));
    }
printf("\n");
  }
  free(A);
  free(B);
  free(C);
  return 0;
}
```

Week 10 C Programming codes

1. Write a C program to find length of string using pointers.

```
#include <stdio.h>
int strlen(const char *str) {
    int l = 0;
    while (*str != '\0') {
        l++;
        str++;
    }
    return l;
}
int main(){
    char a[100];
printf("Enter a string: ");
scanf("%s",a);
    int l= strlen(a);
printf("Length of the string: %d\n",l);
    return 0;
}
```

2. Write a C program to copy one string to another using pointer.

```
#include <stdio.h>
void copyString(char *dest, const char *src) {
     while ((*dest++ = *src++) != '\0');
  }
  int main() {
  char str[100],newstr[100];
  printf("Enter the source string: ");
  scanf("%s",str);
  copyString(newstr,str);
  printf("Copied string: %s\n",newstr);

  return 0;
  }
```

3.Write a C program to concatenate two strings using pointers

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

```
    void concatenateStrings(char *dest, const char *src)
{
        while (*dest != '\0') {
    dest++;
        }
        while ((*dest++ = *src++) != '\0');
    }
    int main() {
        char firststr[100], secondstr[100];
    printf("Enter the first string: ");
    scanf("%s", firststr);
    printf("Enter the second string: ");
    scanf("%s", secondstr);
    concatenateStrings(firststr, secondstr);
    printf("Concatenated string: %s\n",firststr);

        return 0;
    }
```

4. Write a C program to compare two strings using pointers.

```
#include <stdio.h>
int cmpstr(const char *str1, const char *str2) {
    while (*str1 != '\0' && *str2 != '\0') {
        if (*str1 != *str2) {
            return 0;
        }
        str1++;
        str2++;
    }
    return (*str1 == '\0' && *str2 == '\0');
}
int main() {
    char firstStr[100], secondStr[100];
printf("Enter the first string: ");
scanf("%s", firstStr);
printf("Enter the second string: ");
scanf("%s", secondStr);
    if (cmpstr(firstStr, secondStr)) {
printf("The strings are equal.\n");
    } else {
printf("The strings are not equal.\n");
    }
    return 0;
}
```

---

5. WAP to find largest among three numbers using pointer.

```
#include <stdio.h>
int findLargest(int *n1, int *n2, int *n3) {
    int l = *n1;
    if (*n2 > l) {
        l = *n2;
    }
    if (*n3 > l) {
        l = *n3;
    }
    return l;
}
int main() {
    int n1,n2,n3;
printf("Enter the first number: ");
scanf("%d", &n1);
printf("Enter the second number: ");
scanf("%d", &n2);
printf("Enter the third number: ");
scanf("%d", &n3);
    int l = findLargest(&n1, &n2, &n3);
printf("The largest number is: %d\n", l);

    return 0;
}
```

---

6. WAP to find largest among three numbers using pointer.

```
#include <stdio.h>
int findLargest(int *n1, int *n2, int *n3) {
    int l = *n1;
    if (*n2 > l) {
        l = *n2;
    }
    if (*n3 > l) {
        l = *n3;
    }
    return l;
}
int main() {
    int n1,n2,n3;
printf("Enter the first number: ");
scanf("%d", &n1);
printf("Enter the second number: ");
scanf("%d", &n2);
printf("Enter the third number: ");
scanf("%d", &n3);
    int l = findLargest(&n1, &n2, &n3);
printf("The largest number is: %d\n", l);

    return 0;
}
```

---

7. WAP to find factorial of a number using pointer.

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

```
long longFact(int *n) {
    long long f = 1;
    for (int i = 1; i<= *n; i++) {
        f *= i;
    }

    return f;
}

int main() {
    int n;
printf("Enter a number: ");
scanf("%d", &n);
    long long f = Fact(&n);
printf("Factorial of %d is: %lld\n", n, f);
    return 0;
}
```

8.Write a program to print largest even number present in an array using pointer to an array.

```
#include <stdio.h>
int findLargestEven(int *a, int s) {
    int lEven = -1;
    for (int i = 0; i< s; i++) {
        if (a[i] % 2 == 0 && a[i] >lEven) {
lEven = a[i];
        }
    }
    return lEven;
}
int main() {
    int s;
printf("Enter the size of the array: ");
scanf("%d", &s);
    int n[s];
printf("Enter the array elements:\n");
    for (int i = 0; i< s; i++) {
scanf("%d", &n[i]);
    }
    int lEven = findLargestEven(n, s);
    if (lEven != -1) {
printf("The largest even number is: %d\n", lEven);
    } else {
printf("No even numbers found in the array.\n");
    }
    return 0;
}
```

9.WAP to find sum of elements of an array using array of pointer.

```
#include <stdio.h>

int findArraySum(int *a[], int s) {

   int sum = 0;

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

      sum += *a[i];

   }

   return sum;

}

int main() {

   int s;

printf("Enter the size of the array: ");

scanf("%d", &s);

   int n[s];

printf("Enter the array elements:\n");

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

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

   }

   int *ps[s];

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

ps[i] = &n[i];

   }

   int sum = findArraySum(ps, s);
printf("Sum of elements in the array: %d\n", sum);


   return 0;
}
```

10. WAP to compute simple interest using pointers.

```
#include <stdio.h>
float CSI(float *p, float *r, float *t) {
   return (*p * *r * *t) / 100.0;
}
int main() {
   float p, r, t;
printf("Enter principal amount: ");
scanf("%f", &p);
printf("Enter rate of interest: ");
scanf("%f", &r);
printf("Enter time in years: ");
scanf("%f", &t);
   float i = CSI(&p, &r, &t);
printf("Simple Interest: %.2f\n", i);
   return 0;
}
```

11.Write a program to print largest even number present in an array using pointer to an array.

```
#include <stdio.h>
int findLargestEven(int *a, int s) {
   int lEven = -1;
   for (int i = 0; i< s; i++) {
      if (a[i] % 2 == 0 && a[i] >lEven) {
lEven = a[i];
      }
   }
   return lEven;
}
int main() {
   int s;
printf("Enter the size of the array: ");
scanf("%d", &s);
   int n[s];
printf("Enter the array elements:\n");
   for (int i = 0; i< s; i++) {
scanf("%d", &n[i]);
   }
   int lEven = findLargestEven(n, s);
   if (lEven != -1) {
```

```
printf("The largest even number is: %d\n", lEven);
    } else {
printf("No even numbers found in the array.\n");
    }
    return 0;
}
```

Week 11 C Programming Codes

1.Write a C function to return the maximum of three integers.

```
#include <stdio.h>
int findMaximum(int num1, int num2, int num3) {
    int max = num1;
    if (num2 > max) {
        max = num2;
    }
    if (num3 > max) {
        max = num3;
    }
    return max;
}
int main() {
    int num1, num2, num3;
printf("Enter the first number: ");

scanf("%d", &num1);

printf("Enter the second number: ");

scanf("%d", &num2);

printf("Enter the third number: ");

scanf("%d", &num3);

   int maximum = findMaximum(num1, num2, num3);

printf("The maximum number is: %d\n", maximum);


   return 0;

}
```

2.Write a C function to check if a given number is prime or not.

```
#include <stdio.h>

int isPrime(int n) {

   if (n <= 1) {

      return 0;

   }

   for (int i = 2; i * i<= n; i++) {

      if (n % i == 0) {

         return 0;

      }

   }
```

```
    return 1;
}
int main() {
    int n;
printf("Enter a number: ");
scanf("%d", &n);
    if (isPrime(n)) {
printf("%d is a prime number.\n", n);
    } else {
printf("%d is not a prime number.\n", n);
    }
    return 0;
}
```

3.Write a C function to compute the factorial of a non-negative integer.

```
#include <stdio.h>
unsigned long longfactorial(int n) {
    if (n < 0) {
        return 0;
    }
    if (n == 0 || n == 1) {
        return 1;
    }
```

```
   unsigned long long r = 1;

   for (int i = 2; i<= n; i++) {

      r *= i;

   }

   return r;

}

int main() {

   int n;

printf("Enter a non-negative integer: ");

scanf("%d", &n);

   unsigned long long r = factorial(n);

printf("The factorial of %d is: %llu\n", n, r);


   return 0;

}
```

4.Write a C function to swap the values of two integers in actual arguments.

```
#include <stdio.h>

void swapIntegers(int *a, int *b) {

   int temp = *a;

   *a = *b;

   *b = temp;

}
```

```
int main() {
   int num1, num2;
printf("Enter the first integer: ");
scanf("%d", &num1);
printf("Enter the second integer: ");
scanf("%d", &num2);
swapIntegers(&num1, &num2);
printf("After swapping:\n");
printf("First integer: %d\n", num1);
printf("Second integer: %d\n", num2);

   return 0;
}
```

5.Write a C function to compute the sum and average of an array of integers.

```
#include <stdio.h>
void computeSumAndAverage(int *arr, int size, int *sum, float *average) {
   *sum = 0;
   for (int i = 0; i< size; i++) {
      *sum += *(arr + i);
   }
   *average = (float)(*sum) / size;
}
```

```
int main() {
   int size;
printf("Enter the size of the array: ");
scanf("%d", &size);
   int numbers[size];
printf("Enter the array elements:\n");
   for (int i = 0; i< size; i++) {
scanf("%d", &numbers[i]);
   }
   int sum;
   float average;
computeSumAndAverage(numbers, size, &sum, &average);
printf("Sum of the array elements: %d\n", sum);
printf("Average of the array elements: %.2f\n", average);

   return 0;
}
```

6.Write a C function to find the GCD (Greatest Common Divisor) of two nonnegative integers using Euclid's algorithm.

```
#include <stdio.h>
int findGCD(int a, int b) {
   while (b != 0) {
        int temp = b;

        b = a % b;

        a = temp;

    }

    return a;

}

int main() {

    int num1, num2;

printf("Enter the first non-negative integer: ");

scanf("%d", &num1);

printf("Enter the second non-negative integer: ");

scanf("%d", &num2);

    int gcd = findGCD(num1, num2);

printf("The GCD of %d and %d is: %d\n", num1, num2, gcd);


    return 0;

}
```

7.Write a C function to check if a given string is a valid palindrome, considering only alphanumeric characters and ignoring cases.

```
#include <stdio.h>

#include <ctype.h>

#include <string.h>
```

```
int isPalindrome(const char *str) {
    int length = strlen(str);
    int start = 0;
    int end = length - 1;
    while (start < end) {
        while (!isalnum(str[start]) && start < end) {
            start++;
        }
        while (!isalnum(str[end]) && start < end) {
            end--;
        }
        char char1 = tolower(str[start]);
        char char2 = tolower(str[end]);
        if (char1 != char2) {
            return 0;
        }
        start++;
        end--;
    }
    return 1;
}
int main() {
    char input[100];
printf("Enter a string: ");
fgets(input, sizeof(input), stdin);
input[strcspn(input, "\n")] = '\0';
   if (isPalindrome(input)) {
printf("The string is a valid palindrome.\n");
   } else {
printf("The string is not a palindrome.\n");
   }
   return 0;
}
```

8.Write a C function to calculate the sum and difference of two complex numbers.

```
#include <stdio.h>
typedef struct {
   float real;
   float imaginary;
} ComplexNumber;
void addComplex(ComplexNumber num1, ComplexNumber num2,
ComplexNumber *result) {
   result->real = num1.real + num2.real;
   result->imaginary = num1.imaginary + num2.imaginary;
}
```

```
void subtractComplex(ComplexNumber num1, ComplexNumber num2,
ComplexNumber *result) {

   result->real = num1.real - num2.real;

   result->imaginary = num1.imaginary - num2.imaginary;

}

int main() {

ComplexNumber complex1, complex2, sum, difference;

printf("Enter the real part of the first complex number: ");

scanf("%f", &complex1.real);

printf("Enter the imaginary part of the first complex number: ");

scanf("%f", &complex1.imaginary);

printf("Enter the real part of the second complex number: ");

scanf("%f", &complex2.real);

printf("Enter the imaginary part of the second complex number: ");

scanf("%f", &complex2.imaginary);

addComplex(complex1, complex2, &sum);

subtractComplex(complex1, complex2, &difference);

printf("Sum: %.2f + %.2fi\n", sum.real, sum.imaginary);

printf("Difference: %.2f + %.2fi\n", difference.real, difference.imaginary);

   return 0;

}
```

9.Write a C function to find the second largest and second smallest elements in an array of integers.

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

```
void findSecondLargestAndSmallest(int arr[], int size, int *secondLargest, int
*secondSmallest) {
    if (size < 2) {
printf("Array should have at least two elements.\n");
return;
    }
    *secondLargest = (arr[0] >arr[1]) ? arr[0] : arr[1];
    *secondSmallest = (arr[0] <arr[1]) ? arr[0] : arr[1];
    for (int i = 2; i< size; i++) {
        if (arr[i] > *secondLargest) {
            *secondLargest = arr[i];
        } else if (arr[i] < *secondSmallest) {
            *secondSmallest = arr[i];
        }
    }
}
int main() {
    int size;
printf("Enter the size of the array: ");
scanf("%d", &size);
    if (size <= 0) {
printf("Array size should be greater than 0.\n");
        return 1;
    }
    int numbers[size];
printf("Enter the array elements:\n");
    for (int i = 0; i< size; i++) {
scanf("%d", &numbers[i]);
    }
    int secondLargest, secondSmallest;
findSecondLargestAndSmallest(numbers, size, &secondLargest,
&secondSmallest);
printf("Second Largest Element: %d\n", secondLargest);
printf("Second Smallest Element: %d\n", secondSmallest);


    return 0;
}
```

10.Write a C function to find the number of occurrences of each unique element in an array.

```
#include <stdio.h>
void countOccurrences(int arr[], int size) {
    int frequency[size];
    for (int i = 0; i< size; i++) {
        frequency[i] = 0;
    }
    for (int i = 0; i< size; i++) {
        int currentElement = arr[i];
        int isEncountered = 0;
        for (int j = 0; j <i; j++) {
            if (arr[j] == currentElement) {
isEncountered = 1;
break;
            }
        }
        if (!isEncountered) {
            int count = 1;
            for (int j = i + 1; j < size; j++) {
                if (arr[j] == currentElement) {
                    count++;
                }
            }
printf("Element %d occurs %d times\n", currentElement, count);
        }
    }
}
int main() {
    int size;
printf("Enter the size of the array: ");
scanf("%d", &size);
    if (size <= 0) {
printf("Array size should be greater than 0.\n");
```

```
        return 1;
    }
    int numbers[size];
printf("Enter the array elements:\n");
    for (int i = 0; i< size; i++) {
scanf("%d", &numbers[i]);
    }
countOccurrences(numbers, size);

    return 0;
}
```