Assignment-2

1) Research and provide three real-world applications where C programming is extensively used, such as in embedded systems, operating systems, or game development.

three real-world applications where **C programming** :

Operating Systems

- ⇨ Core parts of Windows, Linux are written in C.

Game Development

- ⇨ Popular game engines like Doom built using C.
- ⇨ Allows fast execution and efficient memory handling for real-time games.

Compiler Development

- ⇨ Many compilers are written in C.
- ⇨ C helps low-level software that translates high-level code to machine code.

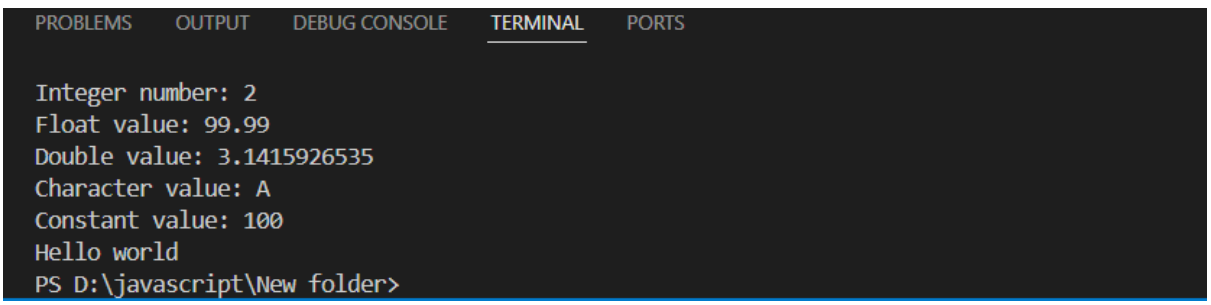
2) o Install a C compiler on your system and configure the IDE. Write your first program to print "Hello, World!" and run it.

```c
#include <stdio.h>

int main(){

    printf("Hello wolrd");
    return 0;
}
```

```
PS D:\javascript\New folder> cd "d:\javascript\New folder\" ; if ($?) { gcc plindrom.c
Hello wolrd
PS D:\javascript\New folder>
```

3) Write a C program that includes variables, constants, and comments. Declare and use different data types (int, char, float) and display their values.

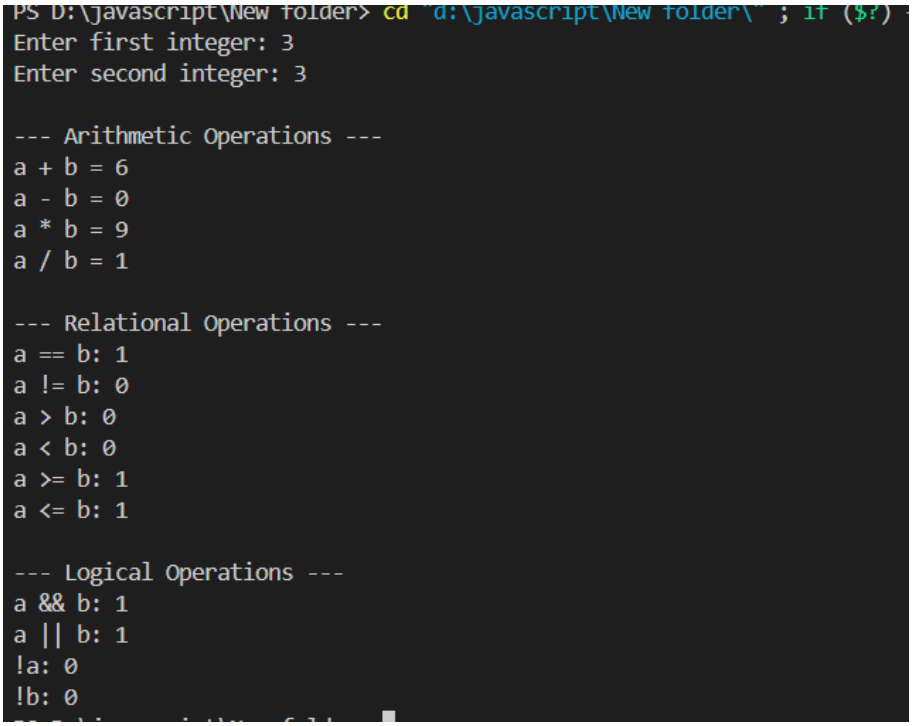
```c
#include <stdio.h>

int main() {
    // Constant declaration
    const int constvalue = 100;

    // Variable declarations
    int num = 2;
    float price = 99.99f;
    double pi = 3.1415926535;
    char grade = 'A';

    // Output all values
    printf("\nInteger number: %d", num);
    printf("\nFloat value: %.2f", price);
    printf("\nDouble value: %.10lf", pi);
    printf("\nCharacter value: %c", grade);
    printf("\nConstant value: %d", constvalue);
    printf("\nHello world");

    return 0;
}
```



4) Write a C program that accepts two integers from the user and performs arithmetic, relational, and logical operations on them. Display the results.

```
#include <stdio.h>

int main() {
    int a, b;

    // Input from user
    printf("Enter first integer: ");
    scanf("%d", &a);

    printf("Enter second integer: ");
    scanf("%d", &b);

    // Arithmetic Operations
    printf("\n--- Arithmetic Operations ---\n");
    printf("a + b = %d\n", a + b);
    printf("a - b = %d\n", a - b);
    printf("a * b = %d\n", a * b);
    printf("a / b = %d\n",  a / b );

    // Relational Operations
    printf("\n--- Relational Operations ---\n");
    printf("a == b: %d\n", a == b);
    printf("a != b: %d\n", a != b);
```

```
    printf("a > b: %d\n", a > b);
    printf("a < b: %d\n", a < b);
    printf("a >= b: %d\n", a >= b);
    printf("a <= b: %d\n", a <= b);

    // Logical Operations
    printf("\n--- Logical Operations ---\n");
    printf("a && b: %d\n", a && b);
    printf("a || b: %d\n", a || b);
    printf("!a: %d\n", !a);
    printf("!b: %d\n", !b);

    return 0;
}
```



5) EXERCISE: o Write a C program to check if a number is even or odd using an if-else statement. Extend the program using a switch statement to display the month name based on the user's input (1 for January, 2 for February, etc.).

```
#include <stdio.h>

int main() {
   int num, month;

   // Part 1: Check Even or Odd using if-else
   printf("Enter a number : ");
   scanf("%d", &num);

   if (num % 2 == 0) {
      printf("The number %d is Even.\n", num);
   } else {
      printf("The number %d is Odd.\n", num);
   }

   // Part 2: show month name using the switch
   printf("\nEnter a number (1 to 12) to get the month name: ");
   scanf("%d", &month);

   switch (month) {
      case 1: printf("January"); break;
      case 2: printf("February"); break;
      case 3: printf("March"); break;
```

```
        case 4: printf("April"); break;
        case 5: printf("May"); break;
        case 6: printf("June"); break;
        case 7: printf("July"); break;
        case 8: printf("August"); break;
        case 9: printf("September"); break;
        case 10: printf("October"); break;
        case 11: printf("November"); break;
        case 12: printf("December"); break;
        default: printf("Invalid month number!");
    }

    return 0;
}
```

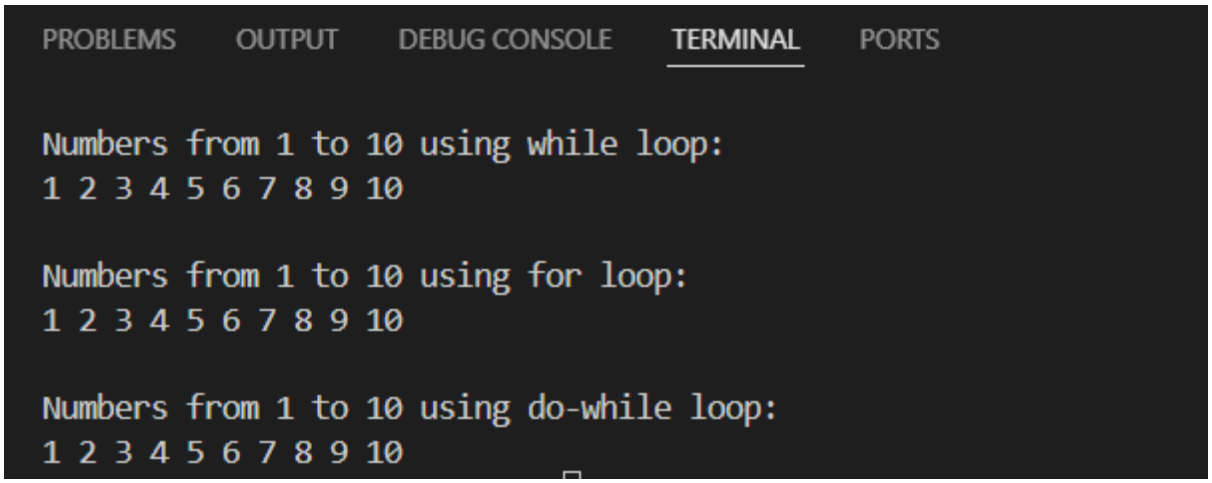
```
PS D:\javascript\New folder> cd "d:\javascript\New folder\" ; i
Enter a number : 2
The number 2 is Even.

Enter a number (1 to 12) to get the month name: 2
February
PS D:\javascript\New folder>
```

6) Write a C program to print numbers from 1 to 10 using all three types of loops (while, for, do-while).

```
#include <stdio.h>

int main() {
```

```
int i;

// Using while loop
printf("Numbers from 1 to 10 using while loop:\n");
i = 1;
while (i <= 10) {
    printf("%d ", i);
    i++;
}

// Using for loop
printf("\n\nNumbers from 1 to 10 using for loop:\n");
for (i = 1; i <= 10; i++) {
    printf("%d ", i);
}

// Using do-while loop
printf("\n\nNumbers from 1 to 10 using do-while loop:\n");
i = 1;
do {
    printf("%d ", i);
    i++;
} while (i <= 10);

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

}



7) Write a C program that uses the break statement to stop printing numbers when it reaches 5. Modify the program to skip printing the number 3 using the continue statement.

```
#include <stdio.h>

int main() {
    int i;

    printf("Printing numbers from 1 to 10:\n");

    for (i = 1; i <= 10; i++) {
        if (i == 3) {
            continue; // Skip number 3
        }
        if (i == 5) {
```

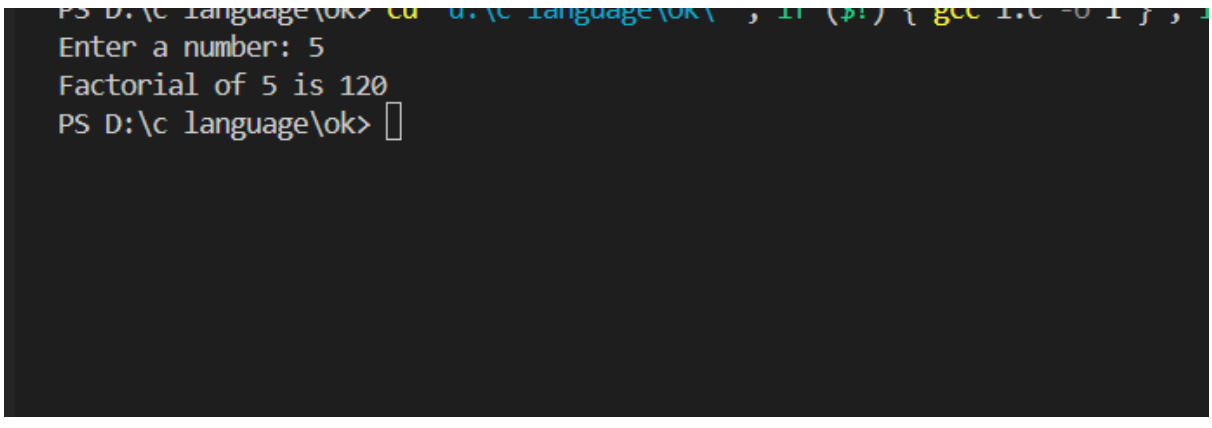
```
        break; // Stop loop when number is 5
    }
    printf("%d ", i);
  }

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

```
PS D:\javascript\New folder> cd "d:\javascript\New folder\" ; if ($?) { gcc plindr
Printing numbers from 1 to 10:
1 2 4
PS D:\javascript\New folder>
```

8) Write a C program that calculates the factorial of a number using a function. Include function declaration, definition, and call.

```
#include <stdio.h>

// Function Declaration
int factorial(int n);

int main() {
  int num;

  // Input from user
  printf("Enter a number: ");
```

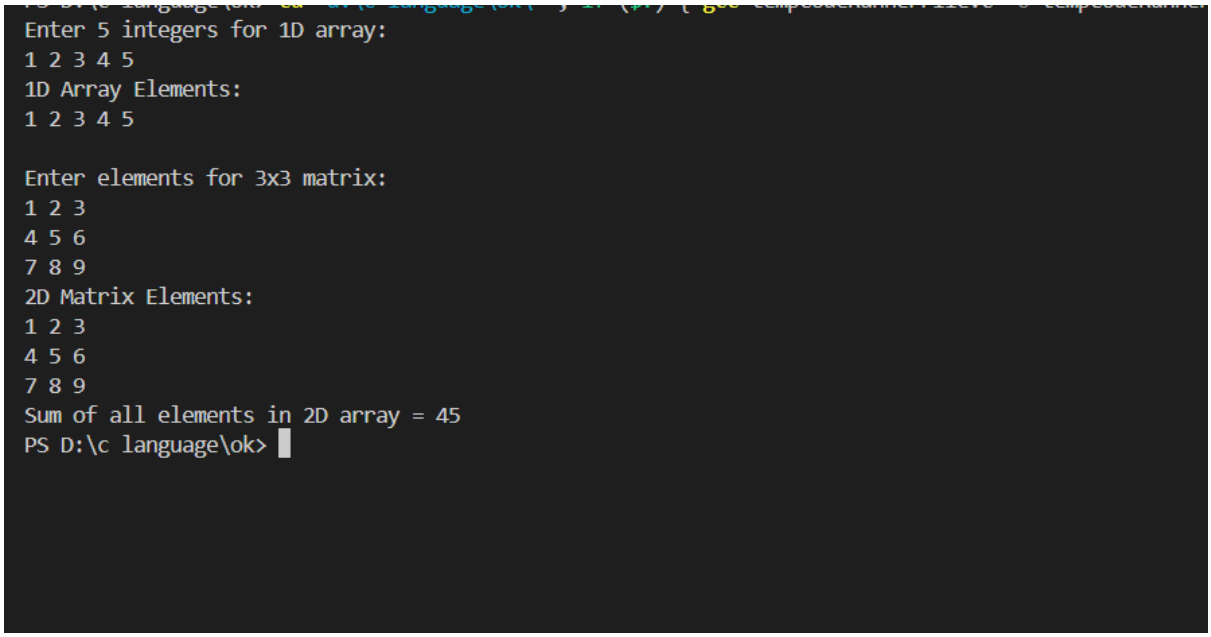
```
    scanf("%d", &num);

    // Handle negative input
    if (num < 0) {
        printf("Factorial is not defined for negative numbers.\n");
    } else {
        // Function Call
        int result = factorial(num);
        printf("Factorial of %d is %d\n", num, result);
    }

    return 0;
}

// Function Definition
int factorial(int n) {
    int fact = 1;
    for(int i = 1; i <= n; i++) {
        fact *= i;
    }
    return fact;
}
```



10) Write a C program that stores 5 integers in a one-dimensional array and prints them. Extend this to handle a two-dimensional array (3x3 matrix) and calculate the sum of all elements.

```
#include <stdio.h>

int main() {

   int arr1[5];
   printf("Enter 5 integers for 1D array:\n");
   for(int i = 0; i < 5; i++) {
      scanf("%d", &arr1[i]);
   }

   printf("1D Array Elements:\n");
   for(int i = 0; i < 5; i++) {
      printf("%d ", arr1[i]);
   }
   printf("\n");


   int matrix[3][3], sum = 0;

   printf("\nEnter elements for 3x3 matrix:\n");
   for(int i = 0; i < 3; i++) {
      for(int j = 0; j < 3; j++) {
         scanf("%d", &matrix[i][j]);
         sum += matrix[i][j];
      }
   }

   printf("2D Matrix Elements:\n");
   for(int i = 0; i < 3; i++) {
      for(int j = 0; j < 3; j++) {
         printf("%d ", matrix[i][j]);
      }
      printf("\n");
```

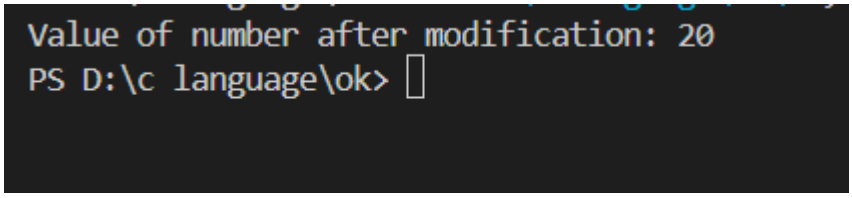
```
    }

    printf("Sum of all elements in 2D array = %d\n", sum);

    return 0;
}
```



10) Write a C program to demonstrate pointer usage. Use a pointer to modify the value of a variable and print the result.

```
#include <stdio.h>

int main() {
    int number = 10;
    int *ptr;
    ptr = &number;

    *ptr = 20;

    // Print the result
    printf("Value of number after modification: %d\n", number);
```

```
    return 0;
}
```



11) Write a C program that takes two strings from the user and concatenates them using strcat(). Display the concatenated string and its length using strlen().

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

int main() {
    char str1[100], str2[100];

    // Input first string
    printf("Enter the first string: ");
    gets(str1);

    // Input second string
    printf("Enter the second string: ");
    gets(str2);

    // Concatenate strings
```

```
    strcat(str1, str2);

    printf("Concatenated string: %s\n", str1);

    // Display length
    printf("Length of concatenated string: %lu\n", strlen(str1));

    return 0;
}
```

```
PS D:\c language\ok> cd "d:\c language\ok\" ; if ($?) { gcc 4.c -o 4 } ; if ($?) { .\4 }
Enter the first string: helo word
Enter the second string: good evning
Concatenated string: helo wordgood evning
Length of concatenated string: 20
PS D:\c language\ok>
```

12) Write a C program that defines a structure to store a student's details (name, roll number, and marks). Use an array of structures to store details of 3 students and print them.

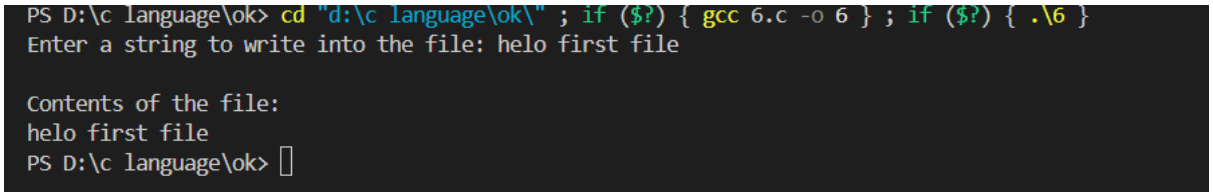
```
#include <stdio.h>

// Define the structure
struct Student {
    char name[50];
    int roll;
    float marks;
};

int main() {
    struct Student students[3];  // Array of 3 structures
```

```c
    // Input details for each student
    for (int i = 0; i < 3; i++) {
        printf("Enter details for student %d:\n", i + 1);
        printf("Name: ");
        scanf("%s", students[i].name);
        printf("Roll Number: ");
        scanf("%d", &students[i].roll);
        printf("Marks: ");
        scanf("%f", &students[i].marks);
    }

    // Display the entered details
    printf("\nStudent Details:\n");
    for (int i = 0; i < 3; i++) {
        printf("Student %d:\n", i + 1);
        printf("Name: %s\n", students[i].name);
        printf("Roll Number: %d\n", students[i].roll);
        printf("Marks: %.2f\n\n", students[i].marks);
    }

    return 0;
}
```

```
PS D:\c language\ok> cd "d:\c language\ok\" ; if ($?) { gcc 5.c -o 5 } ; if ($?) { .\5 }
Enter details for student 1:
Name: smit
Roll Number: 1
Marks: 80
Enter details for student 2:
Name: ved
Roll Number: 2
Marks: 60
Enter details for student 3:
Name: ashu
Roll Number: 3
Marks: 50

Student Details:
Student 1:
Name: smit
Roll Number: 1
Marks: 80.00

Student 2:
Name: ved
Roll Number: 2
Marks: 60.00

Student 3:
Name: ashu
Roll Number: 3
Marks: 50.00
```

13) Write a C program to create a file, write a string into it, close the file, then open the file again to read and display its contents.

```
#include <stdio.h>

int main() {
   FILE *fp;
   char str[100];

   // Write to file
   fp = fopen("sample.txt", "w");
   if (fp == NULL) {
      printf("Error opening file for writing!\n");
      return 1;
   }

   printf("Enter a string to write into the file: ");
   gets(str);

   fprintf(fp, "%s", str);
   fclose(fp);

   // Read from file
   fp = fopen("sample.txt", "r");
   if (fp == NULL) {
      printf("Error opening file for reading!\n");
      return 1;
   }

   printf("\nContents of the file:\n");
   while (fgets(str, sizeof(str), fp) != NULL) {
      printf("%s", str);
   }

   fclose(fp);
   return 0;
}
```


PS D:\c language\ok> cd "d:\c language\ok\" ; if ($?) { gcc 6.c -o 6 } ; if ($?) { .\6 }
Enter a string to write into the file: helo first file
Contents of the file:
helo first file
PS D:\c language\ok>

f