Name : Abhinav Sharma

Qn1

```c
// Write a C program to find the maximum and minimum elements in an array.

#include <stdio.h>

int main(){
   int n;
   printf("Enter number of elements\n");
   scanf("%d",&n);
   int arr[n];



   for(int i=0; i<n; i++){
       printf("Element %d\n",i+1);
       scanf("%d",&arr[i]);
   }
   int max=arr[0],min=arr[0];
   for(int j=0; j<n;j++){
       if(max<arr[j]){
           max=arr[j];
       }
       if(min>arr[j]){
           min=arr[j];
       }

   }
   printf("Maximum :%d\n",max);
   printf("Minimum :%d\n",min);



   return 0;
}
```

Output

```
Enter number of elements
3
Element 1
3
Element 2
4
Element 3
2
Maximum :4
Minimum :2
```

Qn2

```c
// Implement a C program to reverse the elements of an array.

#include <stdio.h>

int main(){
   int n,temp;
   printf("number of element\n");
   scanf("%d",&n);
   int arr[n];
   for(int i=0;i<n;i++){
       printf("Element %d\n",i+1);
       scanf("%d",&arr[i]);
   }
   for( int j=0;j<n/2;j++){
       temp=arr[j];
       arr[j]=arr[n-j-1];
       arr[n-j-1]=temp;

   }
   for(int k=0; k<n;k++){
       printf("%d\n",arr[k]);
   }

   return 0;
}
```

Output

Qn3

```c
// Write a C program to sort an array of integers in ascending order using a sorting algorithm of your choice (e.g., bubble sort, selection sort, insertion sort).
#include <stdio.h>

int main() {
   int n, i, j, key;

   printf("Enter the number of elements: ");
   scanf("%d", &n);

   int arr[n];

   printf("Enter %d elements:\n", n);
   for(i = 0; i < n; i++) {
       printf("Element %d: ", i + 1);
       scanf("%d", &arr[i]);
   }


   for(i = 1; i < n; i++) {
       key = arr[i];
       j = i - 1;
```

```
        while(j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j--;
        }

        arr[j + 1] = key;
    }

     printf("\nSorted array in ascending order:\n");
    for(i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");

    return 0;
}
```

Output

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q2"
3
4
5
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q3"
mac@Abhinavs-MacBook-Pro-2 output % ./"q3"
Enter the number of elements: 4
Enter 4 elements:
Element 1: 1
Element 2: 3
Element 3: 2
Element 4: 6

Sorted array in ascending order:
1 2 3 6
```

Qn4

```
// Implement a C program to find the second largest element in an array.
#include <stdio.h>

int main() {
    int n, i, j, key;

    printf("Enter the number of elements: ");
    scanf("%d", &n);

    int arr[n];
```

```c
    printf("Enter %d elements:\n", n);
    for(i = 0; i < n; i++) {
        printf("Element %d: ", i + 1);
        scanf("%d", &arr[i]);
    }


    for(i = 1; i < n; i++) {
        key = arr[i];
        j = i - 1;


        while(j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j--;
        }

        arr[j + 1] = key;
    }

    printf("the second largest element in array is %d\n",arr[n-2]);

    return 0;
}
```

Output

```
mac@Abhinavs-MacBook-Pro-2 output % ./"q4"
Enter the number of elements: 4
Enter 4 elements:
Element 1: 2
Element 2: 1
Element 3: 4
Element 4: 6
the second largest element in array is 4
```

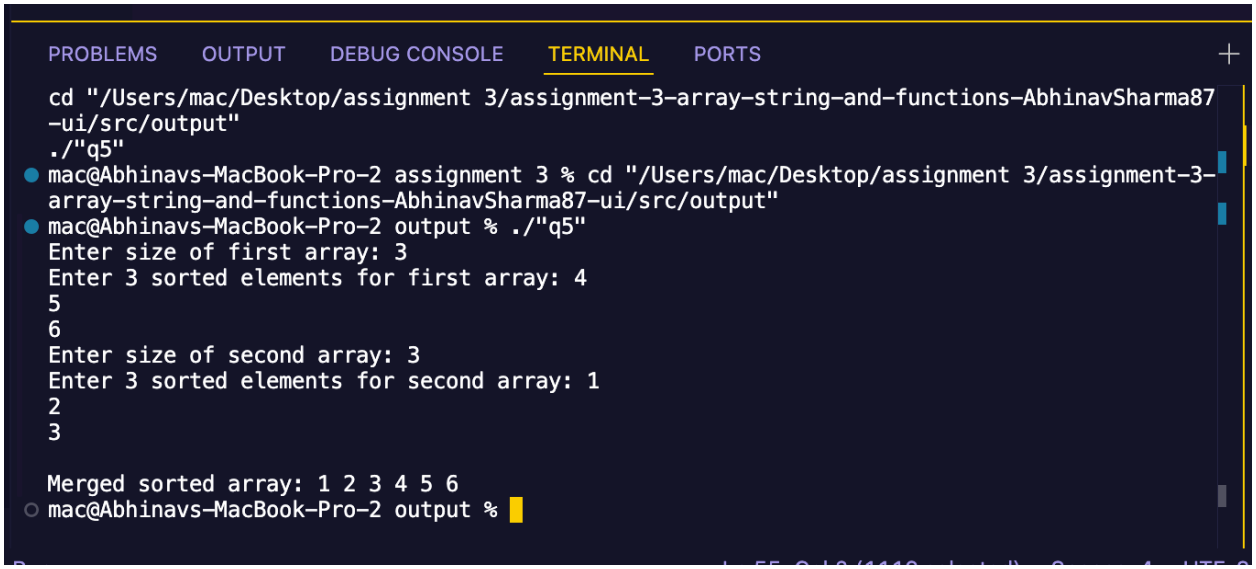
Qn5

```c
// Write a C program to merge two sorted arrays into a single sorted array.

#include <stdio.h>

int main() {
    int n1, n2;
```

```c
printf("Enter size of first array: ");
scanf("%d", &n1);

int arr1[n1];
printf("Enter %d sorted elements for first array: ", n1);
for (int i = 0; i < n1; i++) {
    scanf("%d", &arr1[i]);
}

printf("Enter size of second array: ");
scanf("%d", &n2);

int arr2[n2];
printf("Enter %d sorted elements for second array: ", n2);
for (int i = 0; i < n2; i++) {
    scanf("%d", &arr2[i]);
}

int result[n1 + n2];
int i = 0, j = 0, k = 0;


while (i < n1 && j < n2) {
    if (arr1[i] <= arr2[j]) {
        result[k++] = arr1[i++];
    } else {
        result[k++] = arr2[j++];
    }
}


while (i < n1) {
    result[k++] = arr1[i++];
}


while (j < n2) {
    result[k++] = arr2[j++];
}

printf("\nMerged sorted array: ");
for (int i = 0; i < n1 + n2; i++) {
```

```
        printf("%d ", result[i]);
    }
    printf("\n");

    return 0;
}
```

Output



Qn6

```
// Write a C program to find the length of a string without using the built-in string functions.

#include <stdio.h>

int main(){
    char text[20];
    int i;
    printf("Enter text\n");
    fgets(text, sizeof(text), stdin);

    for(i=0;i<20;i++){
        if (text[i]=='\0'){
            break;
        }
    }
    printf("length %d\n",i-1);

    return 0;
}
```

Output

Qn7

```c
// Implement a C program to reverse a string.

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

int main(){
   int n,temp;
    char arr[30];
   printf("enter string\n");
   scanf("%s",arr);
    n=strlen(arr);


   for( int j=0;j<n/2;j++){
       temp=arr[j];
       arr[j]=arr[n-j-1];
       arr[n-j-1]=temp;

   }

       printf("%s\n",arr);


   return 0;
}
```

Output

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS
cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87
-ui/src/output"
./"q6"
mac@Abhinavs-MacBook-Pro-2 assignment 3 % cd "/Users/mac/Desktop/assignment 3/assignment-3-
array-string-and-functions-AbhinavSharma87-ui/src/output"
mac@Abhinavs-MacBook-Pro-2 output % ./"q6"
Enter text
abhinav
length 7
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q7"
mac@Abhinavs-MacBook-Pro-2 output % ./"q7"
enter string
abhinav
vanihba
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn8

```c
// Write a C program to check if a given string is a palindrome.
#include <stdio.h>
#include <string.h>

int main() {
   char str[100];
   int length, i, isPalindrome = 1;

   printf("Enter a string: ");
   scanf("%s", str);



   length = strlen(str);



   for(i = 0; i < length / 2; i++) {
       if(str[i] != str[length - 1 - i]) {
           isPalindrome = 0;
           break;
       }
   }

    if(isPalindrome == 1) {
       printf("%s is a palindrome\n", str);
   } else {
       printf("%s is not a palindrome\n", str);
   }
```

```c
    return 0;
}
```

Output

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

mac@Abhinavs-MacBook-Pro-2 output % ./"q6"
Enter text
abhinav
length 7
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q7"
mac@Abhinavs-MacBook-Pro-2 output % ./"q7"
enter string
abhinav
vanihba
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q8"
mac@Abhinavs-MacBook-Pro-2 output % ./"q8"
Enter a string: abhinav
abhinav is not a palindrome
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn9

```c
// Implement a C program to count the occurrence of a specific character in a string.
#include <stdio.h>
#include <string.h>

int main() {
    char str[100];
    char ch;
    int i, count = 0;

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);

    printf("Enter the character to count: ");
    scanf("%c", &ch);

    for(i = 0; i < strlen(str); i++) {
        if(str[i] == ch) {
            count++;
        }
    }

    printf("The character '%c' occurs %d time(s) in the string.\n", ch, count);
```

```c
    return 0;
}
```

Output

```
PROBLEMS 1   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q7"
enter string
abhinav
vanihba
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-a
string-and-functions-AbhinavSharma87-ui/src/output"
./"q8"
mac@Abhinavs-MacBook-Pro-2 output % ./"q8"
Enter a string: abhinav
abhinav is not a palindrome
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-a
string-and-functions-AbhinavSharma87-ui/src/output"
./"q9"
mac@Abhinavs-MacBook-Pro-2 output % ./"q9"
Enter a string: abhinav
Enter the character to count: a
The character 'a' occurs 2 time(s) in the string.
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn10

```c
// Write a C program to concatenate two strings without using the built-in string
functions.
#include <stdio.h>

int main() {
    char str1[100], str2[50];
    int i, j;

    printf("Enter first string: ");
    scanf("%s", str1);

    printf("Enter second string: ");
    scanf("%s", str2);

    // Find the end of first string
    i = 0;
    while (str1[i] != '\0') {
        i++;
    }

    // Copy second string to the end of first string
    j = 0;
    while (str2[j] != '\0') {
```

```
        str1[i] = str2[j];
        i++;
        j++;
    }

    // Add null terminator
    str1[i] = '\0';

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

    return 0;
}
```

Output

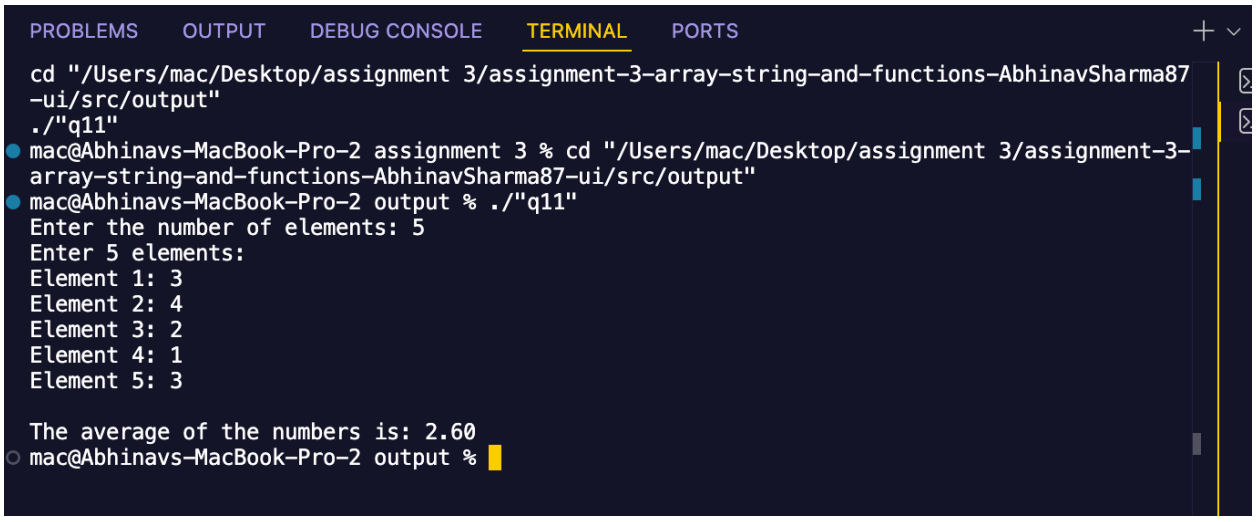
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q8"
abhinav is not a palindrome
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-a
string-and-functions-AbhinavSharma87-ui/src/output"
./"q9"
mac@Abhinavs-MacBook-Pro-2 output % ./"q9"
Enter a string: abhinav
Enter the character to count: a
The character 'a' occurs 2 time(s) in the string.
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-a
string-and-functions-AbhinavSharma87-ui/src/output"
./"q10"
mac@Abhinavs-MacBook-Pro-2 output % ./"q10"
Enter first string: abhinav
Enter second string: sharma

Concatenated string: abhinavsharma
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn11

```
// Write a function named calculateAverage that takes an array of integers as input
and returns the average of the numbers.
#include <stdio.h>

int main() {
    int n, i;
    int sum = 0;
    float average;

    printf("Enter the number of elements: ");
    scanf("%d", &n);

    int arr[n];
```

```c
    printf("Enter %d elements:\n", n);
    for(i = 0; i < n; i++) {
        printf("Element %d: ", i + 1);
        scanf("%d", &arr[i]);
    }

     for(i = 0; i < n; i++) {
        sum += arr[i];
    }

     average = (float)sum / n;

    printf("\nThe average of the numbers is: %.2f\n", average);

    return 0;
}
```

Output



Qn12

```c
//  Write a function named isPalindrome that takes a string as input and returns 1 if it is a palindrome (reads the same forwards and backwards), and 0 otherwise.
#include <stdio.h>
#include <string.h>

// Function to check if a string is palindrome
int isPalindrome(char str[]) {
    int length = strlen(str);
    int i;
```

```c
    for(i = 0; i < length / 2; i++) {
        if(str[i] != str[length - 1 - i]) {
            return 0;
        }
    }

    return 1;
}

int main() {
    char str[100];

    printf("Enter a string: ");
    scanf("%s", str);


    if(isPalindrome(str) == 1) {
        printf("'%s' is a palindrome.\n", str);
    } else {
        printf("'%s' is not a palindrome.\n", str);
    }

    return 0;
}
```

Output

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

mac@Abhinavs-MacBook-Pro-2 assignment 3 % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
Enter the number of elements: 5
Enter 5 elements:
Element 1: 3
Element 2: 4
Element 3: 2
Element 4: 1
Element 5: 3

The average of the numbers is: 2.60
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q12"
mac@Abhinavs-MacBook-Pro-2 output % ./"q12"
Enter a string: abhinav
'abhinav' is not a palindrome.
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn13

```c
// Write a function named findFactorial that takes an integer as input and returns its factorial.
#include <stdio.h>


long long findFactorial(int n) {
   long long factorial = 1;
   int i;

   for(i = 1; i <= n; i++) {
       factorial *= i;
   }

   return factorial;
}

int main() {
   int num;
   long long result;

   printf("Enter a number: ");
   scanf("%d", &num);

   if(num < 0) {
       printf("Factorial is not defined for negative numbers.\n");
   } else {

       result = findFactorial(num);
       printf("Factorial of %d = %lld\n", num, result);
   }

   return 0;
}
```

Output

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
string-and-functions-AbhinavSharma87-ui/src/output"
./"q12"
mac@Abhinavs-MacBook-Pro-2 output % ./"q12"
Enter a string: abhinav
'abhinav' is not a palindrome.
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q13"
mac@Abhinavs-MacBook-Pro-2 output % ./"q13"
Enter a number: 123
Factorial of 123 = 0
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q13"
mac@Abhinavs-MacBook-Pro-2 output % ./"q13"
Enter a number: 3
Factorial of 3 = 6
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn14

```c
// Write a function named convertTemperature that takes a temperature value in Celsius
and converts it to Fahrenheit. The function should return the converted temperature.
#include <stdio.h>
void convertTemperature(int ce){
   int f = (ce*9/5)+32;
   printf("%d\n",f);

}

int main(){
   int ce;
   printf("Enter temp in celcicus\n");
   scanf("%d",&ce);
   convertTemperature(ce);



   return 0;
}
```

Output

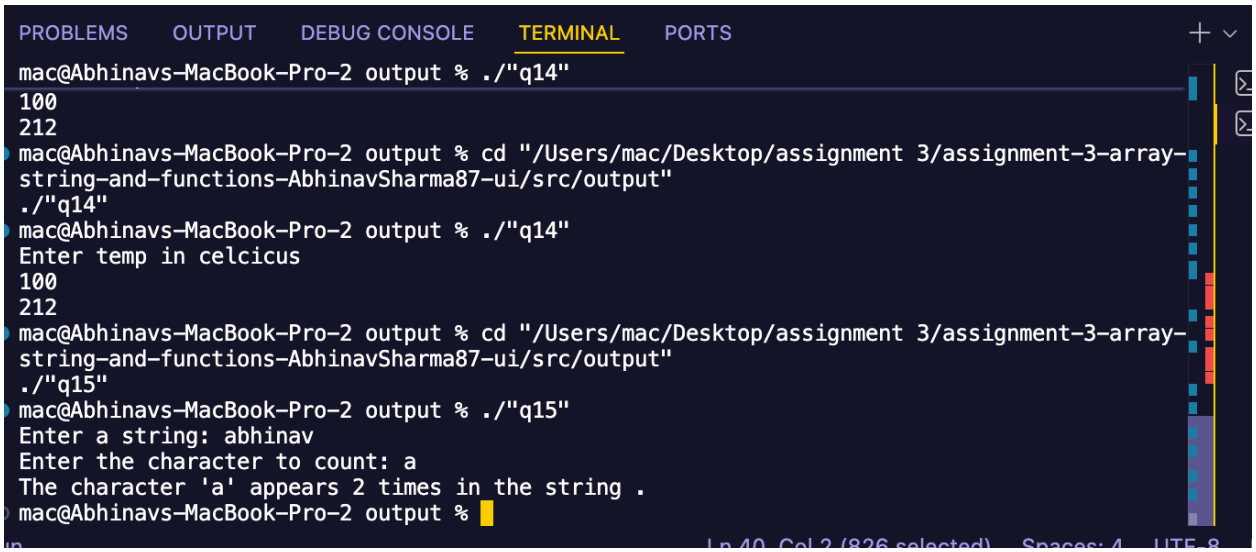
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 desktop % assignment 3/
mac@Abhinavs-MacBook-Pro-2 desktop % cd\desktop\assignment 3
zsh: command not found: cddesktopassignment
mac@Abhinavs-MacBook-Pro-2 desktop % cd "/Users/mac/Desktop/assignment 3/assignment-3-array
-string-and-functions-AbhinavSharma87-ui/src/output"
./"q14"
mac@Abhinavs-MacBook-Pro-2 output % ./"q14"
Enter temp in celcicus
100
212
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q14"
mac@Abhinavs-MacBook-Pro-2 output % ./"q14"
Enter temp in celcicus
100
212
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn15

```c
// Write a function named countOccurrences that takes a string and a character as
input and returns the number of times the character appears in the string.

#include <stdio.h>
#include <ctype.h>



int countOccurrences(char str[], char ch) {
   int count = 0;
   int i = 0;



   ch = tolower(ch);

   while(str[i] != '\0') {
       if(tolower(str[i]) == ch) {
           count++;
       }
       i++;
   }

   return count;
}

int main() {
   char str[100];
   char ch;
```

```c
    int occurrences;

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);

    printf("Enter the character to count: ");
    scanf("%c", &ch);

    occurrences = countOccurrences(str, ch);

    printf("The character '%c' appears %d times in the string .\n", ch, occurrences);

    return 0;
}
```

Output



Qn16

```c
// Write a function named reverseArray that takes an array of integers as input and reverses the order of the elements in the array.

#include <stdio.h>

void reverseArray(int n, int arr[]){
    int temp;
    for( int j=0;j<n/2;j++){
        temp=arr[j];
        arr[j]=arr[n-j-1];
        arr[n-j-1]=temp;
    }
```

```c
}
int main(){
   int n;
   printf("number of element\n");
   scanf("%d",&n);
   int arr[n];
   for(int i=0;i<n;i++){
       printf("Element %d\n",i+1);
       scanf("%d",&arr[i]);
   }
   reverseArray(n, arr);
   for(int k=0; k<n;k++){
       printf("%d\n",arr[k]);
   }

return 0;
   }
```

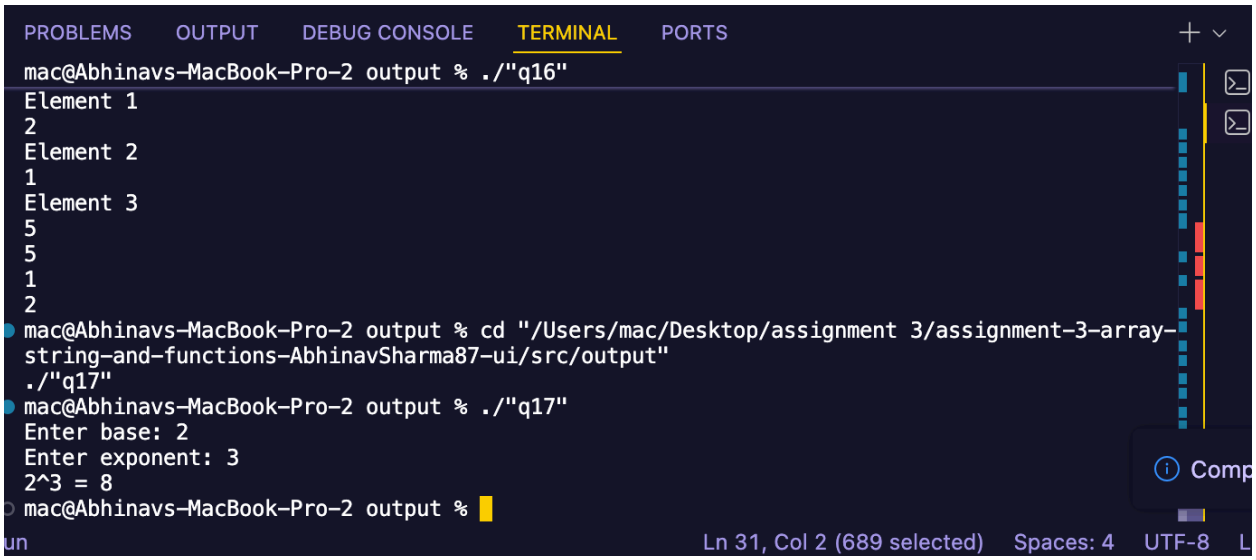
Output

Qn17

```c
// Write a function named calculatePower that takes two integers, base and exponent,
as input and returns the result of raising the base to the exponent.
#include <stdio.h>

int calculatePower(int base, int exponent) {
```

```c
    int result = 1;
    int i;

    // Multiply base, exponent times
    for(i = 0; i < exponent; i++) {
        result = base*result;
    }

    return result;
}

int main() {
    int base, exponent, result;

    printf("Enter base: ");
    scanf("%d", &base);

    printf("Enter exponent: ");
    scanf("%d", &exponent);


    result = calculatePower(base, exponent);

    printf("%d^%d = %d\n", base, exponent, result);

    return 0;
}
```

Output



Qn18

```c
// Write a function named findPrimeNumbers that takes an integer n as input and prints all prime numbers from 1 to n.
#include <stdio.h>


void findPrimeNumbers(int n) {
   int i, j, isPrime;

   printf("Prime numbers from 1 to %d are:\n", n);

   // Loop through numbers from 2 to n
   for(i = 2; i <= n; i++) {
       isPrime = 1;


       for(j = 2; j <= i / 2; j++) {
           if(i % j == 0) {
               isPrime = 0;
               break;
           }
       }


       if(isPrime == 1) {
           printf("%d ", i);
       }
   }

   printf("\n");
}

int main() {
   int n;

   printf("Enter a number: ");
   scanf("%d", &n);

   if(n < 2) {
       printf("There are no prime numbers less than 2.\n");
   } else {
       // Call the function
```

```
        findPrimeNumbers(n);
    }

    return 0;
}
```

Output

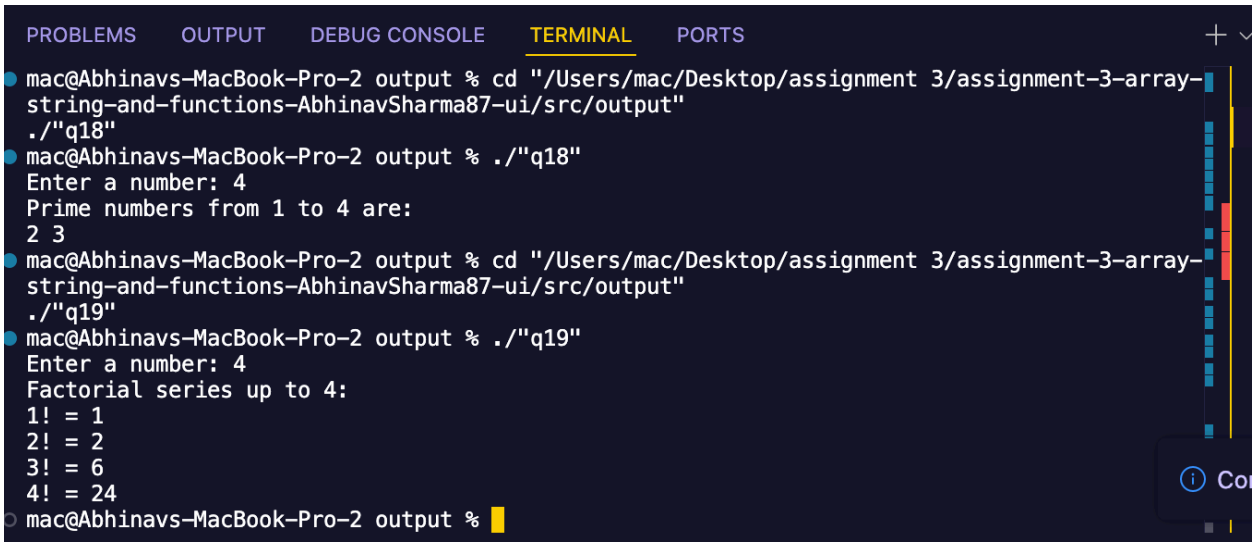
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q16"
1
2
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q17"
mac@Abhinavs-MacBook-Pro-2 output % ./"q17"
Enter base: 2
Enter exponent: 3
2^3 = 8
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q18"
mac@Abhinavs-MacBook-Pro-2 output % ./"q18"
Enter a number: 4
Prime numbers from 1 to 4 are:
2 3
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn19

```
//  Write a function named calculateFactorialSeries that takes an integer n as input and prints the factorial series up to n.
#include <stdio.h>


void calculateFactorialSeries(int n) {
    int i, j;
    long long factorial;

    printf("Factorial series up to %d:\n", n);

    for(i = 1; i <= n; i++) {
        factorial = 1;


        for(j = 1; j <= i; j++) {
            factorial *= j;
        }

        printf("%d! = %lld\n", i, factorial);
```

```
    }
}

int main() {
    int n;

    printf("Enter a number: ");
    scanf("%d", &n);

    if(n < 1) {
        printf("Please enter a positive number.\n");
    } else {

        calculateFactorialSeries(n);
    }

    return 0;
}
```

Output

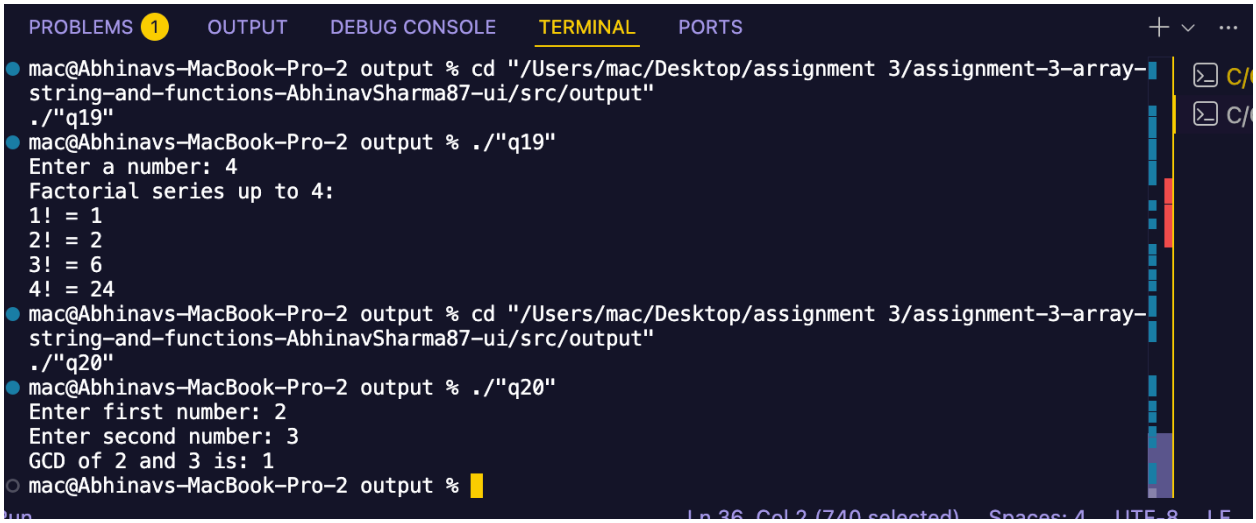


Qn20

```
// Write a function named calculateGCD that takes two integers as input and returns
their greatest common divisor (GCD).

#include <stdio.h>

int calculateGCD(int a, int b) {
    int gcd, i;

    // Find the smaller number
```

```c
    int smaller = (a < b) ? a : b;

    for(i = smaller; i >= 1; i--) {
        if(a % i == 0 && b % i == 0) {
            gcd = i;
            break;
        }
    }

    return gcd;
}

int main() {
    int num1, num2, gcd;

    printf("Enter first number: ");
    scanf("%d", &num1);

    printf("Enter second number: ");
    scanf("%d", &num2);

    // Call the function
    gcd = calculateGCD(num1, num2);

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

    return 0;
}
```

Output



Qn21

```c
// Write a recursive function named calculateFactorial that takes an integer n as input and returns its factorial.

#include <stdio.h>


long long calculateFactorial(int n) {

   if(n == 0 || n == 1) {
       return 1;
   }

    return n * calculateFactorial(n - 1);
}

int main() {
   int num;
   long long result;

   printf("Enter a number: ");
   scanf("%d", &num);

   if(num < 0) {
       printf("Factorial is not defined for negative numbers.\n");
   } else {

       result = calculateFactorial(num);
       printf("Factorial of %d = %lld\n", num, result);
   }

   return 0;
}
```

Output

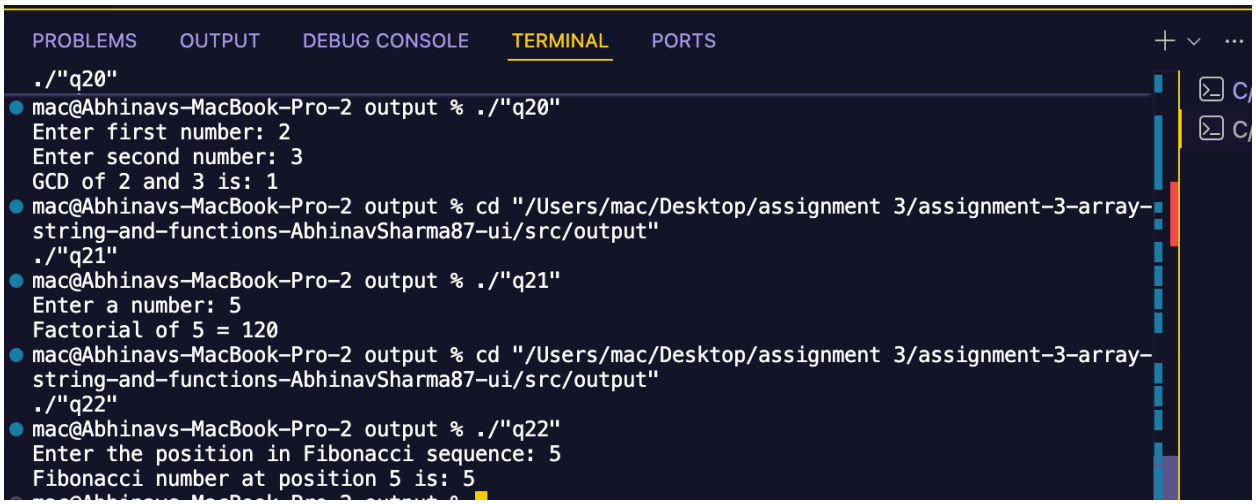
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q19"
2! = 2
3! = 6
4! = 24
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q20"
mac@Abhinavs-MacBook-Pro-2 output % ./"q20"
Enter first number: 2
Enter second number: 3
GCD of 2 and 3 is: 1
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-
string-and-functions-AbhinavSharma87-ui/src/output"
./"q21"
mac@Abhinavs-MacBook-Pro-2 output % ./"q21"
Enter a number: 5
Factorial of 5 = 120
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn22

```c
// Write a recursive function named calculateFibonacci that takes an integer n as
input and returns the nth Fibonacci number. The Fibonacci sequence starts with 0 and
1, and each subsequent number is the sum of the two preceding numbers.

#include <stdio.h>


int calculateFibonacci(int n) {

   if(n == 0) {
       return 0;
   }
   if(n == 1) {
       return 1;
   }


   return calculateFibonacci(n - 1) + calculateFibonacci(n - 2);
}

int main() {
   int num, result;

   printf("Enter the position in Fibonacci sequence: ");
   scanf("%d", &num);

   if(num < 0) {
```

```c
        printf("Please enter a non-negative number.\n");
    } else {
        result = calculateFibonacci(num);
        printf("Fibonacci number at position %d is: %d\n", num, result);
    }

    return 0;
}
```

Output

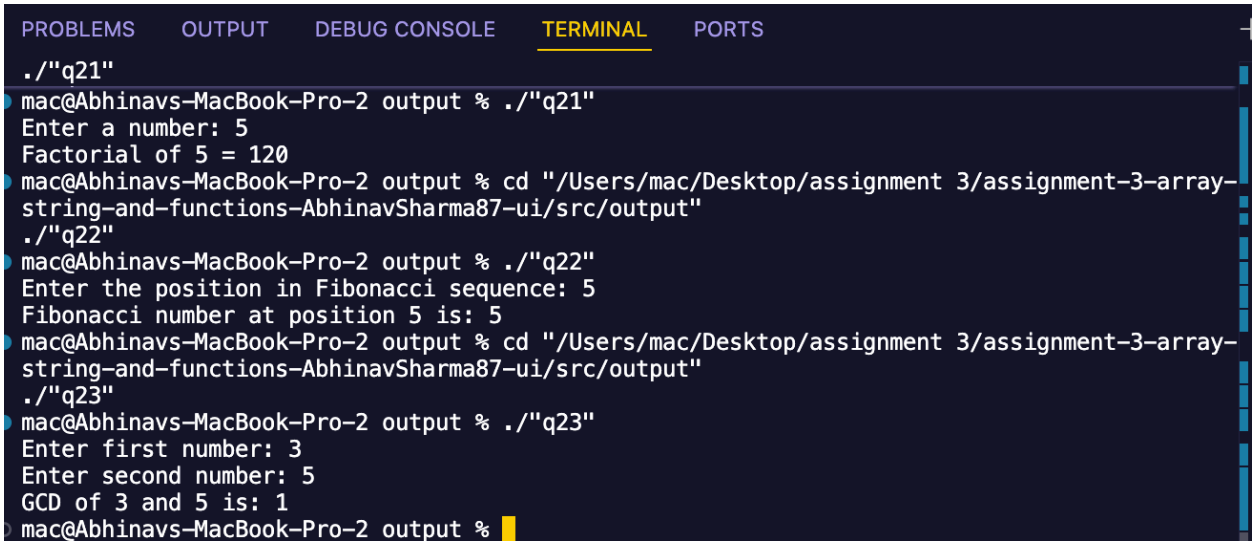


Qn23

```c
// Write a recursive function named calculateGCD that takes two integers a and b as input and returns their greatest common divisor (GCD).

#include <stdio.h>


int calculateGCD(int a, int b) {

    if(b == 0) {
        return a;
    }

    return calculateGCD(b, a % b);
}

int main() {
    int num1, num2, gcd;

    printf("Enter first number: ");
    scanf("%d", &num1);
```

```c
    printf("Enter second number: ");
    scanf("%d", &num2);



    gcd = calculateGCD(num1, num2);

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

    return 0;
}
```

Output



Qn24

```c
// Write a recursive function named calculatePower that takes two integers base and exponent as input and returns the result of raising the base to the exponent.
#include <stdio.h>



int calculatePower(int base, int exponent) {
    // Base case: any number to power 0 is 1
    if(exponent == 0) {
        return 1;
    }



    return base * calculatePower(base, exponent - 1);
}


int main() {
```

```c
    int base, exponent, result;

    printf("Enter base: ");
    scanf("%d", &base);

    printf("Enter exponent: ");
    scanf("%d", &exponent);



    result = calculatePower(base, exponent);

    printf("%d^%d = %d\n", base, exponent, result);

    return 0;
}
```

Output

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

mac@Abhinavs-MacBook-Pro-2 output % ./"q22"
Enter the position in Fibonacci sequence: 5
Fibonacci number at position 5 is: 5
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q23"
mac@Abhinavs-MacBook-Pro-2 output % ./"q23"
Enter first number: 3
Enter second number: 5
GCD of 3 and 5 is: 1
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q24"
mac@Abhinavs-MacBook-Pro-2 output % ./"q24"
Enter base: 3
Enter exponent: 2
3^2 = 9
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn26

```c
// Write a recursive function named reverseString that takes a string as input and returns the reversed string.

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



void reverseString(char str[], int start, int end) {
    char temp;
```

```
    if(start >= end) {
        return;
    }


    temp = str[start];
    str[start] = str[end];
    str[end] = temp;


    reverseString(str, start + 1, end - 1);
}

int main() {
    char str[100];

    printf("Enter a string: ");
    fgets(str, sizeof(str), stdin);


    str[strcspn(str, "\n")] = '\0';

    int length = strlen(str);

    printf("\nOriginal string: %s\n", str);


    reverseString(str, 0, length - 1);

    printf("Reversed string: %s\n", str);

    return 0;
}
```

Output

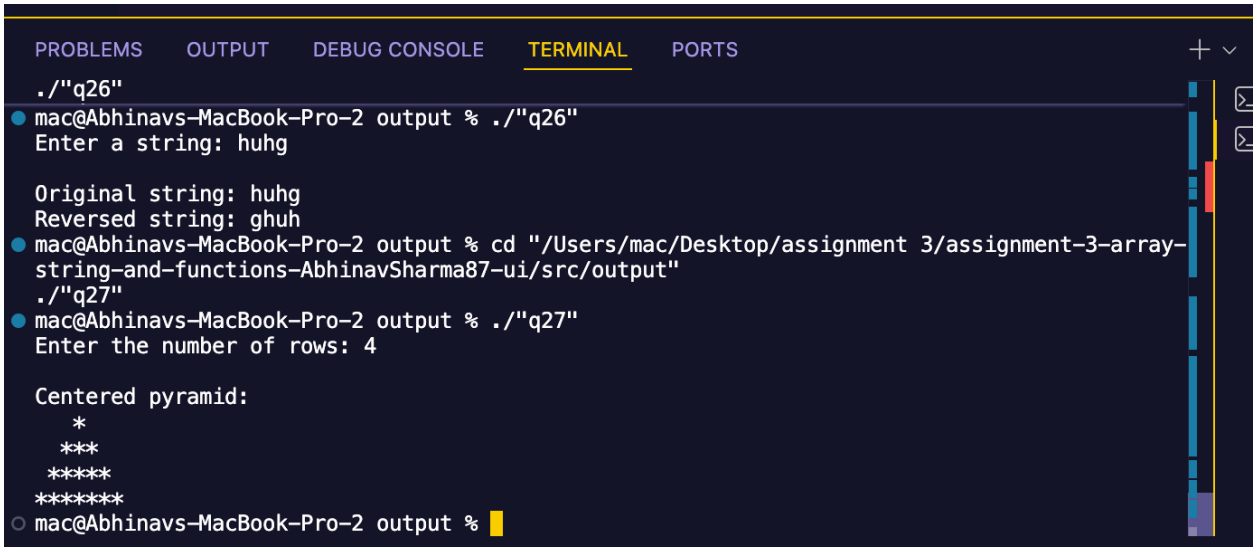
```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q25"
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q26"
mac@Abhinavs-MacBook-Pro-2 output % ./"q26"
Enter a string: 4

Original string: 4
Reversed string: 4
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q26"
mac@Abhinavs-MacBook-Pro-2 output % ./"q26"
Enter a string: huhg

Original string: huhg
Reversed string: ghuh
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn27

```c
// Write a recursive function named printTriangle that takes an integer n as input and prints a triangle of asterisks (*) with n rows.

#include <stdio.h>


void printChar(char ch, int count) {
   if(count == 0) {
       return;
   }
   printf("%c", ch);
   printChar(ch, count - 1);
}


void printTriangle(int n, int current) {

   if(current > n) {
       return;
   }


   printChar(' ', n - current);


   printChar('*', 2 * current - 1);
```

```c
    printf("\n");

    // Recursive call for next row
    printTriangle(n, current + 1);
}

int main() {
    int num;

    printf("Enter the number of rows: ");
    scanf("%d", &num);

    if(num > 0) {
        printf("\nCentered pyramid:\n");
        printTriangle(num, 1);
    } else {
        printf("Please enter a positive number.\n");
    }

    return 0;
}
```

Output



Qn28

```c
// Write a recursive function named calculateBinary that takes an integer n as input and returns its binary representation as a string.

#include <stdio.h>
```

```c
#include <string.h>

void calculateBinary(int n, char* result) {

   if (n == 0) {
       strcpy(result, "0");
       return;
   }
   if (n == 1) {
       strcpy(result, "1");
       return;
   }



   char temp[65];
   calculateBinary(n / 2, temp);
   sprintf(result, "%s%d", temp, n % 2);
}

int main() {
   int n;
   char binary[65];

   printf("Enter an integer: ");
   scanf("%d", &n);

   if (n < 0) {
       printf("Please enter a non-negative integer.\n");
       return 1;
   }

   calculateBinary(n, binary);
   printf("Binary representation of %d is: %s\n", n, binary);

   return 0;
}
```

Output

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q27"
mac@Abhinavs-MacBook-Pro-2 output % ./"q27"
Enter the number of rows: 4

Centered pyramid:
   *
  ***
 *****
*******
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q28"
mac@Abhinavs-MacBook-Pro-2 output % ./"q28"
Enter an integer: 5
Binary representation of 5 is: 101
mac@Abhinavs-MacBook-Pro-2 output %
un                                   Ln 39, Col 2 (801 selected)   Spaces: 4   UTF
```

Qn29

```c
// Write a recursive function named isPalindrome that takes a string as input and returns 1 if it is a palindrome (reads the same forwards and backwards), and 0 otherwise.
#include <stdio.h>
#include <string.h>

int isPalindrome(char* str, int start, int end) {
    if (start >= end) {
        return 1;
    }

    if (str[start] != str[end]) {
        return 0;
    }


    return isPalindrome(str, start + 1, end - 1);
}

int main() {
    char str[100];

    printf("Enter a string: ");
    scanf("%s", str);

    int len = strlen(str);
```

```
    if (isPalindrome(str, 0, len - 1)) {
        printf("\"%s\" is a palindrome.\n", str);
    } else {
        printf("\"%s\" is not a palindrome.\n", str);
    }

    return 0;
}
```

Output

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
mac@Abhinavs-MacBook-Pro-2 output % ./"q27"
   *
  ***
 *****
*******
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q28"
mac@Abhinavs-MacBook-Pro-2 output % ./"q28"
Enter an integer: 5
Binary representation of 5 is: 101
mac@Abhinavs-MacBook-Pro-2 output % cd "/Users/mac/Desktop/assignment 3/assignment-3-array-string-and-functions-AbhinavSharma87-ui/src/output"
./"q29"
mac@Abhinavs-MacBook-Pro-2 output % ./"q29"
Enter a string: abhinav
"abhinav" is not a palindrome.
mac@Abhinavs-MacBook-Pro-2 output %
```

Qn30

```
//  Write a recursive function named countOccurrences that takes a string and a character as input and returns the number of times the character appears in the string.

#include <stdio.h>

int countOccurrences(char* str, char ch) {

    if (*str == '\0') {
        return 0;
    }


    if (*str == ch) {
        return 1 + countOccurrences(str + 1, ch);
    } else {
        return countOccurrences(str + 1, ch);
```

```
    }
}

int main() {
    char str[100];
    char ch;

    printf("Enter a string: ");
    scanf("%s", str);

    printf("Enter a character to count: ");
    scanf(" %c", &ch);

    int result = countOccurrences(str, ch);

    printf("The character '%c' appears %d time in \"%s\"\n", ch, result, str);

    return 0;
}
```

Output