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30459

23.1

Practical 03

01. Write a program to input two numbers and display the highest number.

```
#include <stdio.h>

int main()
{
    int num1, num2;

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

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

    if (num1 > num2) {
        printf("The highest number is: %d\n", num1);
    } else if (num2 > num1) {
        printf("The highest number is: %d\n", num2);
    } else {
        printf("Both numbers are equal.\n");
    }

    return 0;
}
```

02. Write a complete program to ask user enter three integer numbers, and then tell the user the largest value and smallest value among the three numbers.

```
#include <stdio.h>

int main()
{
    int num1, num2, num3;
    int largest, smallest;

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

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

    printf("Enter the third number: ");
    scanf("%d", &num3);

    largest = smallest = num1;

    if (num2 > largest)
        largest = num2;
    else if (num2 < smallest)
        smallest = num2;

    if (num3 > largest)
        largest = num3;
    else if (num3 < smallest)
        smallest = num3;

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

    return 0;
}
```

03.Display employee name, new salary, when the user inputs employee name, and basic salary. You can refer following formula and the table to calculate new salary:

$$\text{New Salary} = \text{Basic Salary} + \text{Increment}$$

<u>Basic Salary</u>	<u>Increment</u>
Less than 5000	5% of Basic Salary
More than or equal 5000	
And less than 10000	10% of Basic Salary
More than or equal 10,000	15% of Basic Salary

```
#include <stdio.h>

int main()
{
    char employeeName[50];
    float basicSalary, newSalary, increment;

    printf("Enter employee name: ");
    scanf("%s", &employeeName);

    printf("Enter basic salary: ");
    scanf("%f", &basicSalary)

    if (basicSalary < 5000)
        increment = basicSalary * 0.05;
    else if (basicSalary >= 5000)
        increment = basicSalary * 0.1;
    else if (basicSalary < 10000)
        increment = basicSalary * 0.1;
    else
        increment = basicSalary * 0.15;

    newSalary = basicSalary + increment;

    printf("Employee Name: %s\n", employeeName);
    printf("New Salary: %.2f\n", newSalary);

    return 0;
}
```

04.Diameter, Circumference and Area of a Circle) Write a program that reads in the radius of a circle and prints the circle's diameter, circumference and area. Use the constant value 3.14159 for π . Perform each of these calculations inside the printf statement(s) and use the conversion specifier %f.

```
#include <stdio.h>

int main()
{
    float radius;
    const float PI = 3.14159;

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

    printf("Diameter: %f\n", 2 * radius);
    printf("Circumference: %f\n", 2 * PI * radius);
    printf("Area: %f\n", PI * radius * radius);

    return 0;
}
```

05. Write a program that reads in two integers and determines and prints if the first is a multiple of the second.

```
#include <stdio.h>

int main()
{
    int num1, num2;

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

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

    if (num1 % num2 == 0) {
        printf("%d is a multiple of %d\n", num1, num2);
    } else {
        printf("%d is not a multiple of %d\n", num1, num2);
    }

    return 0;
}
```

06. Write a C program that prints the integer equivalents of some uppercase letters, lowercase letters, digits and special symbols. As a minimum, determine the integer equivalents of the following: A B C a b c 0 1 2 \$ * + / and the blank character.

```
#include <stdio.h>

int main()
{
    char ch;

    printf("ASCII values of uppercase letters:\n");
    for (ch = 'A'; ch <= 'Z'; ch++) {
        printf("%c: %d\n", ch, ch);
    }

    printf("\nASCII values of lowercase letters:\n");
    for (ch = 'a'; ch <= 'z'; ch++) {
        printf("%c: %d\n", ch, ch);
    }

    printf("\nASCII values of digits:\n");
    for (ch = '0'; ch <= '9'; ch++) {
        printf("%c: %d\n", ch, ch);
    }

    printf("\nASCII values of special symbols:\n");
    printf("$: %d\n", '$');
    printf("*: %d\n", '*');
    printf("+: %d\n", '+');
    printf("/: %d\n", '/');
    printf("Blank Character: %d\n", ' ');
}
```

```
#include <stdio.h>

int main()
{
    char ch;

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

    printf("ASCII value of '%c': %d\n", ch, ch);
}
```

07.The gross remuneration of a company salesman comprises the Basic Salary and certain additional allowances and bonuses as given below: Salesmen with over 5 years' service receive a 10% additional allowance of Basic Salary each month. Salesmen working in Colombo (Input character 'C' if the city is Colombo) receive an additional allowance of Rs. 2,500/- per month. The monthly bonus

Monthly Sales(Rs)	Bonus as a percentage of monthly sales
0-25000	10
25000-50000	12
>=50000	15

payment is computed as given below:

Write a program to output the gross monthly remuneration of a salesman.

```
#include <stdio.h>

int main()
{
    float basicSalary;
    int yearsOfService;
    char city;
    float additionalAllowance = 0,bonus = 0,grossRemuneration;

    printf("Enter the basic salary: ");
    scanf("%f", &basicSalary);

    printf("Enter the number of years of service: ");
    scanf("%d", &yearsOfService);

    printf("Enter the city: ");
    scanf(" %c", &city);

    if (yearsOfService > 5)
        additionalAllowance += 0.10 * basicSalary;
    if (city == 'C')

        additionalAllowance += 2500;
    if (basicSalary >= 50000)

        bonus += 0.15 * basicSalary;
    else if (basicSalary >= 25000)
        bonus += 0.12 * basicSalary;
    else
        bonus += 0.10 * basicSalary;

    grossRemuneration = basicSalary + additionalAllowance + bonus;
```

```
        printf("Gross Monthly Remuneration: %.2f\n", grossRemuneration);  
    }
```


Practical 04

01. Use If-Else and write a program that reads an integer and determines and prints if the number is even or odd. (i.e. divisible by 2)

```
#include <stdio.h>

int main()
{
    int number;

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

    if (number % 2 == 0) {
        printf("%d is even.\n", number);
    } else {
        printf("%d is odd.\n", number);
    }
    return 0;
}
```

Re-write the above program using a switch statement instead of an If-Else statement!

```
#include <stdio.h>

int main() {
    int number;

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

    switch (number % 2) {
        case 0:
            printf("%d is even.\n", number);
            break;
        case 1:
            printf("%d is odd.\n", number);
            break;
    }

    return 0;
}
```

02. Write a simple menu driven calculator to perform (+ - / *) operations. (The program must display a menu to select the desired operator.)

```
#include <stdio.h>

int main() {
    int choice;
    float num1, num2, result;

    printf("Menu:\n");
    printf("1. Addition\n");
    printf("2. Subtraction\n");
    printf("3. Multiplication\n");
    printf("4. Division\n");
    printf("Enter your choice (1-4): ");
    scanf("%d", &choice);

    printf("Enter two numbers: ");
    scanf("%f %f", &num1, &num2);

    switch (choice) {
        case 1:
            result = num1 + num2;
            printf("Result: %.2f\n", result);
            break;
        case 2:
            result = num1 - num2;
            printf("Result: %.2f\n", result);
            break;
        case 3:
            result = num1 * num2;
            printf("Result: %.2f\n", result);
            break;
        case 4:
            if (num2 != 0) {
                result = num1 / num2;
                printf("Result: %.2f\n", result);
            } else {
                printf("Error: Division by zero is not
allowed.\n");
            }
            break;
        default:
            printf("Invalid choice.\n");
    }
}
```

03.Create a text-based, menu-driven program that allows the user to choose whether to calculate the circumference of a circle, the area of a circle or the volume of a sphere. The program should then input a radius from the user, perform the appropriate calculation and display the result.

```
#include <stdio.h>

#define PI 3.14159

int main()
{
    int choice;
    float radius, result;

    printf("Menu:\n");
    printf("1. Calculate Circumference of a Circle\n");
    printf("2. Calculate Area of a Circle\n");
    printf("3. Calculate Volume of a Sphere\n");
    printf("Enter your choice (1-3): ");
    scanf("%d", &choice);

    printf("Enter the radius: ");
    scanf("%f", &radius);

    switch (choice)
    {
        case 1:
            result = 2 * PI * radius;
            printf("Circumference: %.2f\n", result);
            break;
        case 2:
            result = PI * radius * radius;
            printf("Area: %.2f\n", result);
            break;
        case 3:
            result = (4.0 / 3.0) * PI * radius * radius *
radius;
            printf("Volume: %.2f\n", result);
            break;
        default:
            printf("Invalid choice.\n");
    }

    return 0;
}
```

04. Write a C program to read a character from the user and determine whether the given letter is vowel or not. (Use a switch statement which also includes 'default' state).

```
#include <stdio.h>

int main() {
    char vowel;

    printf("Enter a character: ");
    scanf("%c", &vowel);

    switch (vowel)
    {
        case 'a':
            printf("vowel\n");break;
        case 'e':
            printf("vowel\n");break;
        case 'i':
            printf("vowel\n");break;
        case 'o':
            printf("vowel\n");break;
        case 'u':
            printf("vowel\n");break;
        default:
            printf("not a vowel!\n");break;
    }
}
```

05. Write a C program to enter month number and print total number of days in month using switch case. First assume that the given month belongs to a non-leap year.

```
#include <stdio.h>

int main()
{
    int month;

    printf("Enter the month number (1-12): ");
    scanf("%d", &month);

    switch (month) {
        case 1:
            printf("January has 31 days.\n");break;
        case 2:
            printf("February has 28 days.\n");break;
        case 3:
            printf("March has 31 days.\n");break;
        case 4:
            printf("April has 30 days.\n");break;
        case 5:
            printf("May has 31 days.\n");break;
        case 6:
            printf("June has 30 days.\n");break;
        case 7:
            printf("July has 31 days.\n");break;
        case 8:
            printf("August has 31 days.\n");break;
        case 9:
            printf("September has 30 days.\n");break;
        case 10:
            printf("October has 31 days.\n");break;
        case 11:
            printf("November has 30 days.\n");break;
        case 12:
            printf("December has 31 days.\n");break;
        default:
            printf("Invalid month number.\n");break;
    }

    return 0;
}
```

Practical 05

1. _Write a C program to print numbers from 0 to 100. (You are required to write 3 separate answers each using While, Do..While, For, looping structures)

- While

```
#include <stdio.h>

int main() {
    int number = 0;

    while (number <= 100) {
        printf("%d ", number);
        number++;
    }

    return 0;
}
```

- Do while

```
#include <stdio.h>

int main() {
    int number = 0;

    do {
        printf("%d ", number);
        number++;
    } while (number <= 100);

    return 0;
}
```

- For

```
#include <stdio.h>

int main() {
    for (int number = 0; number <= 100; number++) {
        printf("%d ", number);
    }

    return 0;
}
```

2. Write a C program to calculate and print the total of 10 marks and the average. If the average is less than 50 program should print "Fail!" otherwise "Pass!"

```
#include <stdio.h>

int main()
{
    int marks[10];
    int total = 0;

    printf("Enter 10 marks:\n");
    for (int i = 0; i < 10; i++) {
        scanf("%d", &marks[i]);
        total += marks[i];
    }

    float average = (float)total / 10;

    printf("Total: %d\n", total);
    printf("Average: %.2f\n", average);

    if (average < 50) {
        printf("Fail!\n");
    } else {
        printf("Pass!\n");
    }

    return 0;
}
```

3. Write a C program to calculate factorial of a user given number.

Hint:

- Select an appropriate looping structure.
- Factorial of '0' is '1' ($0! = 1$)
- Ex: factorial of number 5 is calculated as $5! = 5*4*3*2*1$

```
#include <stdio.h>

int main()
{
    int number;
    int factorial = 1;

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

    if (number < 0) {
        printf("Factorial is not defined for negative numbers.\n");
    } else {
        for (int i = 1; i <= number; i++) {
            factorial *= i;
        }

        printf("Factorial of %d is %d\n", number, factorial);
    }

    return 0;
}
```


4. Write a C program to calculate the sum of all digits of a user given number.
If user input 123 your program should output 6. (calculated as 1+2+3)

```
#include <stdio.h>

int main() {
    int number, sum = 0;

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

    int remainder;
    while (number > 0) {
        remainder = number % 10;
        sum += remainder;
        number /= 10;
    }

    printf("Sum of digits: %d\n", sum);

    return 0;
}
```

5. Write a C program to reverse the digits of a number using do-while statement.

```
#include <stdio.h>

int main()
{
    int number, reversedNumber = 0, remainder;

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

    do {
        remainder = number % 10;
        reversedNumber = reversedNumber * 10 + remainder;
        number = number / 10;
    } while (number != 0);

    printf("Reversed number: %d\n", reversedNumber);

    return 0;
}
```

6. Write a C program to calculate nth power of a given integer. The user input base and exponent. (Do NOT use inbuilt functions, instead use a loop)

```
#include <stdio.h>

int main()
{
    int base, exponent, result = 1;

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

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

    int i;
    for (i = 0; i < exponent; i++) {
        result *= base;
    }

    printf("%d raised to the power %d is: %d\n", base,
exponent, result);

    return 0;
}
```

7. Write a C program to print first 10 numbers of "Fibonacci Sequence".

```
#include <stdio.h>

int main() {
    int n = 10;
    int fib[n];
    int i;

    fib[0] = 0;
    fib[1] = 1;

    for (i = 2; i < n; i++) {
        fib[i] = fib[i-1] + fib[i-2];
    }

    printf("The first 10 numbers of the Fibonacci sequence\n");
    are:\n");
    for (i = 0; i < n; i++) {
        printf("%d ", fib[i]);
    }
    printf("\n");

    return 0;
}
```

8. Write a C program to check whether a given number is an Armstrong Number! (Refer to previous flowcharts)

```
#include <stdio.h>

int main() {
    int number, originalNumber, remainder, result = 0, n = 0;

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

    originalNumber = number;

    while (originalNumber != 0) {
        originalNumber /= 10;
        ++n;
    }

    originalNumber = number;

    while (originalNumber != 0) {
        remainder = originalNumber % 10;
        int power = 1;
        for (int i = 1; i <= n; ++i) {
            power *= remainder;
        }
        result += power;
        originalNumber /= 10;
    }

    if (result == number)
        printf("%d is an Armstrong number.\n", number);
    else
        printf("%d is not an Armstrong number.\n", number);

    return 0;
}
```

9. Write a C program to print all the ASCII values for letters A to Z.

```
#include <stdio.h>

int main()
{
    char letter;

    printf("ASCII values for letters A to Z:\n");

    for (letter = 'A'; letter <= 'Z'; ++letter) {
        printf("%c: %d\n", letter, letter);
    }

    return 0;
}
```

10. Write a program to print this pattern.

```
*  
  
**  
  
***  
  
****  
  
*****
```

```
#include <stdio.h>  
  
int main()  
{  
    int rows = 5; // number of rows in the pattern  
    int i, j;  
  
    for (i = 1; i <= rows; ++i)  
    {  
        for (j = 1; j <= i; ++j)  
        {  
            printf("*");  
        }  
        printf("\n");  
    }  
  
    return 0;  
}
```

11. Write a program to check whether a given number is prime or not.

```
#include <stdio.h>

int main()
{
    int number, i, isPrime = 1;

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

    if (number == 0 || number == 1) {
        isPrime = 0;
    } else {
        for (i = 2; i <= number / 2; ++i) {
            if (number % i == 0) {
                isPrime = 0;
                break;
            }
        }
    }

    if (isPrime) {
        printf("%d is a prime number.\n", number);
    } else {
        printf("%d is not a prime number.\n", number);
    }

    return 0;
}
```


12. Write a C program to print all factors of a given integer.

```
#include <stdio.h>

int main() {
    int number, i;

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

    printf("Factors of %d are: ", number);

    for (i = 1; i <= number; ++i) {
        if (number % i == 0) {
            printf("%d ", i);
        }
    }

    printf("\n");

    return 0;
}
```

13. Write a C program to add all user inputs until user input '-1'. And then display the sum.

```
#include <stdio.h>

int main() {
    int number;
    int sum = 0;

    printf("Enter numbers to be added (enter -1 to stop):\n");

    while (1) {
        scanf("%d", &number);

        if (number == -1) {
            break;
        }

        sum += number;
    }

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

    return 0;
}
```

14. Write a C program to read user inputs for an integer array (size = 10) and print the array.

```
#include <stdio.h>

int main()
{
    int array[10];
    int i;

    printf("Enter 10 integers:\n");

    for (i = 0; i < 10; i++) {
        scanf("%d", &array[i]);
    }

    printf("The entered array is: ");
    for (i = 0; i < 10; i++) {
        printf("%d ", array[i]);
    }
    printf("\n");

    return 0;
}
```

15. Re-Write the above code to count all the even numbers in above integer array and display the count.

```
#include <stdio.h>

int main()
{
    int array[10];
    int i, count = 0;

    printf("Enter 10 integers:\n");

    for (i = 0; i < 10; i++) {
        scanf("%d", &array[i]);
    }

    for (i = 0; i < 10; i++) {
        if (array[i] % 2 == 0) {
            count++;
        }
    }

    printf("The count of even numbers in the array is: %d\n",
count);

    return 0;
}
```

Section B

1. Input 10 numbers and to output number of positive, number of negative, number of zeros.

```
#include <stdio.h>

int main()
{
    int numbers[10];
    int i, positiveCount = 0, negativeCount = 0, zeroCount = 0;

    printf("Enter 10 numbers:\n");

    for (i = 0; i < 10; i++) {
        scanf("%d", &numbers[i]);
    }

    for (i = 0; i < 10; i++) {
        if (numbers[i] > 0) {
            positiveCount++;
        } else if (numbers[i] < 0) {
            negativeCount++;
        } else {
            zeroCount++;
        }
    }

    printf("Positive numbers: %d\n", positiveCount);
    printf("Negative numbers: %d\n", negativeCount);
    printf("Zeros: %d\n", zeroCount);

    return 0;
}
```

2. Input Marks of 10 students and output the maximum , minimum and average Marks

```
#include <stdio.h>

int main()
{
    int marks[10];
    int i, totalMarks = 0, maxMarks, minMarks;

    printf("Enter marks of 10 students:\n");

    for (i = 0; i < 10; i++) {
        scanf("%d", &marks[i]);
        totalMarks += marks[i];

        if (i == 0) {
            maxMarks = marks[i];
            minMarks = marks[i];
        } else {
            if (marks[i] > maxMarks) {
                maxMarks = marks[i];
            }
            if (marks[i] < minMarks) {
                minMarks = marks[i];
            }
        }
    }

    double averageMarks = (double) totalMarks / 10;

    printf("Maximum Marks: %d\n", maxMarks);
    printf("Minimum Marks: %d\n", minMarks);
    printf("Average Marks: %.2lf\n", averageMarks);

    return 0;
}
```

3. Input price of 10 items and display the average value of an Item , number of items which the price is greater than 200.

```
#include <stdio.h>

int main()
{
    double prices[10];
    int i, count = 0;
    double total = 0.0;

    printf("Enter prices of 10 items:\n");

    for (i = 0; i < 10; i++) {
        scanf("%lf", &prices[i]);
        total += prices[i];

        if (prices[i] > 200) {
            count++;
        }
    }

    double average = total / 10;

    printf("Average value of an item: %.2lf\n", average);
    printf("Number of items with price > 200: %d\n", count);

    return 0;
}
```

4. Input the Employee no and the Basic Salary of the Employees in an organisation ending with the dummy value -999 for Employee no and count the number Employees whose Basic Salary ≥ 5000 .

```
#include <stdio.h>

int main() {
    int employeeNo, count = 0;
    double basicSalary;

    printf("Enter employee number and basic salary : \n");

    while (1) {
        scanf("%d", &employeeNo);

        if (employeeNo == -999) {
            break;
        }

        scanf("%lf", &basicSalary);

        if (basicSalary >= 5000) {
            count++;
        }
    }

    printf("Number of employees with a basic salary >=
5000: %d\n", count);

    return 0;
}
```


5. Input employee number, and hours worked by employees, and to display the following: Employee number, Over Time Payment, and the percentage of employees whose Over Time Payment exceeding the Rs. 4000/-. The user should input -999 as employee number to end the program, and the normal Over Time Rate is Rs.150 per hour and Rs. 200 per hour for hours in excess of 40.

```
#include <stdio.h>

int main() {
    int employeeNo, count = 0, overtimeCount = 0;
    double hoursWorked, overtimePayment, totalOvertimePayment = 0.0;

    printf("Enter employee number and hours worked :\n");

    scanf("%d", &employeeNo);

    while (employeeNo != -999) {
        scanf("%lf", &hoursWorked);

        if (hoursWorked > 40) {
            overtimePayment = 150 * 40 + 200 * (hoursWorked - 40);
        } else {
            overtimePayment = 150 * hoursWorked;
        }
        printf("Employee number: %d\n", employeeNo);
        printf("Overtime payment: %.2lf\n", overtimePayment);

        totalOvertimePayment += overtimePayment;
        count++;
        if (overtimePayment > 4000) {
            overtimeCount++;
        }
        scanf("%d", &employeeNo);
    }
    double percentageExceeding4000 = (double) overtimeCount / count * 100;

    printf("\nSummary:\n");
    printf("Total employees: %d\n", count);
    printf("Total overtime payment: %.2lf\n", totalOvertimePayment);
    printf("Percentage of employees with overtime payment exceeding Rs. 4000: %.2lf%%\n", percentageExceeding4000);
}
```