PF LAB 05 TASKS

SECTION 1: Nested if-else Statements

Example 1:

SOURCE CODE

```
#include <stdio.h>
int main()
{
  int score;
  printf("Enter your score: ");
  scanf("%d", &score);
  if (score >= 90) {
  if (score >= 95) {
     printf("Grade: A+\n");
  }
  else {
    printf("Grade: A\n");
  }}
  else if (score >= 80) {
  if (score >= 85)
  {
    printf("Grade: B+\n");
  }
  else {
    printf("Grade: B\n");
  }}
  else {
   printf("Grade: C or lower\n");
  }
  return 0;
}
```

OUTPUT

```
Enter your score: 90
Grade: A
```

Example 2:

SOURCE CODE

```
#include <stdio.h>
int main()
{
int temperature;
printf("Enter the temperature in Celsius: ");
scanf("%d", &temperature);
if (temperature >= 30)
{
    if(temperature >= 40)
{
   printf("It's very hot outside!\n");
}
else {
   printf("It's hot outside.\n"); }
}
else if (temperature >= 20) {
   printf("It's warm outside.\n");
}
else if (temperature >= 10) {
  printf("It's cool outside.\n");
}
else {
  printf("It's cold outside.\n");
}
return 0;
}
```

OUTPUT

```
Enter the temperature in Celsius: 20
It's warm outside.
```

Problem 1: Write a program that categorizes a person's age into different life stages: Child, Teenager, Adult, and Senior, using nested if-else statements.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int age;
   printf("Enter your age: ");
   scanf("%d", &age);
   if (age >= 0) {
      if (age <= 12) {
         printf("You are a Child.\n");
      } else if (age <= 19) {
         printf("You are a Teenager.\n");
      } else if (age <= 59) {
         printf("You are an Adult.\n");
      } else {
         printf("You are a Senior.\n");
      }
   }
   else {
      printf("Invalid age.\n");
   }
   return 0;
}
```

OUTPUT

```
Enter your age: 19
You are a Teenager.
```

Problem 2: Create a program that determines if a number is positive, negative, or zero, and if it's positive, checks if it's an even or odd number.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num;
   printf("Enter an integer: ");
   scanf("%d", &num);
   if (num > 0) {
      printf("The number is positive.\n");
      if (num % 2 == 0) {
         printf("The number is even.\n");
      } else {
         printf("The number is odd.\n");
      }
   } else if (num < 0) {
      printf("The number is negative.\n");
   } else {
      printf("The number is zero.\n");
   }
   return 0;
}
```

OUTPUT

```
Enter an integer: 5
The number is positive.
The number is odd.
```

SECTION 2: Logical Operators

Example 1:

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int age = 20;
   int hasLicense = 1;
   if (age >= 18 && hasLicense)
 {
    printf("You are eligible to drive.\n");
 }
  else
{
   printf("You are not eligible to drive.\n");
}
  return 0;
}
```

OUTPUT

```
You are eligible to drive.
```

Example 2:

SOURCE CODE

```
#include <stdio.h>
int main()
{
  int score1, score2, score3;
  printf("Enter three test scores: ");
  scanf("%d %d %d", &score1, &score2, &score3);
  if (score1 > 50 && score2 > 50 && score3 > 50)
{
  printf("You passed all the tests.\n");
}
else
{
printf("You did not pass all the tests.\n");
}
return 0;
}
```

OUTPUT

```
Enter three test scores:
50
23
76
You did not pass all the tests.
```

Problem 1: Write a program that checks if a number is divisible by both 3 and 5 using logical operators.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num;
   printf("Enter a number: ");
   scanf("%d", &num);
   if ((num % 3 == 0) && (num % 5 == 0))
   {
      printf("%d is divisible by both 3 and 5.\n", num);
   }
   else
   {
      printf("%d is not divisible by both 3 and 5.\n", num);
   }
   return 0;
}
```

OUTPUT

```
Enter a number: 15
15 is divisible by both 3 and 5.
```

Problem 2: Create a program that checks if a person is eligible to vote based on their age and citizenship status.

SOURCE CODE

```
#include <stdio.h>
int main()
 {
   int age;
   char citizenship;
   printf("Enter your age: ");
   scanf("%d", &age);
   printf("Are you a citizen? (Y/N): ");
   scanf(" %c", &citizenship);
   if (age >= 18 && citizenship == 'Y') {
      printf("You are eligible to vote.\n");
   } else {
      printf("You are not eligible to vote.\n");
   }
   return 0;
}
```

OUTPUT

```
Enter your age: 18
Are you a citizen? (Y/N): Y
You are eligible to vote.
```

SECTION 3: Conditional (Ternary) Operators

Example 1:

SOURCE CODE

```
#include <stdio.h>
int main()
{
  int number;
  printf("Enter a number: ");
  scanf("%d", &number);
  (number % 2 == 0) ? printf("Even\n") : printf("Odd\n");
  return 0;
}
```

OUTPUT

```
Enter a number: 4
Even
```

Example 2:

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int age;
   printf("Enter your age: ");
   scanf("%d", &age);
   age >= 18 ? printf("You are eligible to vote.\n") : printf("You are not eligible to vote.\n");
   return 0;
}
```

OUTPUT

```
Enter your age: 19
You are eligible to vote.
```

Problem 1: Write a program using a ternary operator to find the maximum of two numbers.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num1, num2, max;
   printf("Enter two numbers: ");
   scanf("%d %d", &num1, &num2);
   max = (num1 > num2) ? num1 : num2;
   printf("The maximum of %d and %d is: %d\n", num1, num2, max);
   return 0;
}
```

OUTPUT

```
Enter two numbers: 3 5
The maximum of 3 and 5 is: 5
```

Problem 2: Use the ternary operator to check if a number is positive, negative, or zero.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num;
   printf("Enter a number: ");
   scanf("%d", &num);
   const char* result = (num > 0) ? "Positive" : ((num < 0) ? "Negative" : "Zero");
   printf("The number is %s.\n", result);
   return 0;
}
```

OUTPUT

```
Enter a number: -9
The number is Negative.
```

SECTION 4: Bitwise Operators

Example 1:

SOURCE CODE

```
#include <stdio.h>
int main()
{
    int a = 5;
    int b = 9;
    printf("a & b = %d\n", a & b);
    printf("a | b = %d\n", a | b);
    printf("a ^ b = %d\n", a ^ b);
    printf("~a = %d\n", ~a);
    return 0;
}
```

OUTPUT

```
a & b = 1
a | b = 13
a ^ b = 12
~a = -6
```

Example 2:

SOURCE CODE

```
#include <stdio.h>
int main()
{
int a = 5;
int result = a << 1;
printf("Result after left shift: %d\n", result);
return 0;
}
```

OUTPUT

```
Result after left shift: 10
```

Problem 1: Write a program to swap two numbers using bitwise XOR.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int a, b;
   printf("Enter two numbers:\n");
   scanf("%d %d", &a, &b);
   a = a ^ b;  // Step 1: a becomes a XOR b
   b = a ^ b;  // Step 2: b becomes (a XOR b) XOR b = a
   a = a ^ b;  // Step 3: a becomes (a XOR b) XOR a = b
   printf("After swapping: a = %d, b = %d\n", a, b);
   return 0;
}
```

OUTPUT

```
Enter two numbers:
4
5
After swapping: a = 5, b = 4
```

Problem 2: Create a program that counts the number of 1s in the binary representation of a number.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int number, count = 0;
   printf("Enter a number: ");
   scanf("%d", &number);
   while (number > 0)
   {
      count += number & 1;
      number >>= 1;
   }
   printf("The number of 1s in the binary representation is: %d\n", count);
   return 0;
}
```

OUTPUT

```
Enter a number: 7
The number of 1s in the binary representation is: 3
```

SECTION 5: Modulus Operator

Example 1:

SOURCE CODE

```
#include <stdio.h>
int main()
{
    int number;
    printf("Enter a number: ");
    scanf("%d", &number);
    if (number % 2 == 0)
 {
   printf("The number is even.\n");
 }
   else
 {
   printf("The number is odd.\n");
 }
   return 0;
 }
```

OUTPUT

```
Enter a number: 6
The number is even.
```

Example 2:

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num;
   printf("Enter a number: ");
   scanf("%d", &num);
   if (num % 5 == 0)
 {
   printf("The number is divisible by 5.\n");
 }
   else
 {
   printf("The number is not divisible by 5.\n");
 }
   return 0;
 }
```

OUTPUT

```
Enter a number: 10
The number is divisible by 5.
```

Problem 1: Write a program that checks if a year is a leap year using the modulus operator.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int year;
   printf("Enter a year: ");
   scanf("%d", &year);
   if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0))
   {
      printf("%d is a leap year.\n", year);
   }
   else
   {
      printf("%d is not a leap year.\n", year);
   }
   return 0;
}
```

OUTPUT

```
Enter a year: 2020
2020 is a leap year.
```

Problem 2: Create a program that calculates the sum of digits of a number until the result is a single digit (e.g., 123 -> 6).

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int number, sum, digit;
   printf("Enter a number: ");
   scanf("%d", &number);
   while (number >= 10)
   {
      sum = 0;
      while (number != 0)
      {
         digit = number % 10;
         sum += digit;
         number /= 10;
      }
      number = sum;
   }
   printf("The single-digit sum is: %d\n", number);
   return 0;
}
```

OUTPUT

```
Enter a number: 234
The single-digit sum is: 9
```

PROBLEMS

1. Write a program to find the greatest of three numbers using nested if-else statements.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int num1, num2, num3;
   printf("Enter three numbers: \n");
   scanf("%d %d %d", &num1, &num2, &num3);
   if (num1 >= num2) {
      if (num1 >= num3)
      {
         printf("The greatest number is: %d\n", num1);
      } else {
         printf("The greatest number is: %d\n", num3);
      }
   } else {
      if (num2 >= num3) {
         printf("The greatest number is: %d\n", num2);
      } else {
         printf("The greatest number is: %d\n", num3);
      }
   }
   return 0;
}
```

OUTPUT

```
Enter three numbers:
2
5
6
The greatest number is: 6
```

2. Create a program that calculates the final grade of a student based on multiple criteria, including attendance, assignment scores, and exam results, using nested decision structures.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   float attendance, assignment, exam, finalGrade;
   printf("Enter attendance percentage (out of 100): ");
   scanf("%f", &attendance);
   printf("Enter assignment score (out of 100): ");
   scanf("%f", &assignment);
   printf("Enter exam score (out of 100): ");
   scanf("%f", &exam);
   if (attendance >= 75) {
      if (assignment >= 50) {
         if (exam >= 50) {
            finalGrade = (attendance * 0.2) + (assignment * 0.3) + (exam * 0.5);
            printf("Final Grade: %.2f\n", finalGrade);
            if (finalGrade >= 90) {
               printf("Letter Grade: A\n");
            } else if (finalGrade >= 80) {
               printf("Letter Grade: B\n");
            } else if (finalGrade >= 70) {
               printf("Letter Grade: C\n");
            } else if (finalGrade >= 60) {
               printf("Letter Grade: D\n");
            } else {
               printf("Letter Grade: F\n");
            }
         } else {
            printf("Failed due to insufficient exam score (below 50).\n");
         }
      } else {
         printf("Failed due to insufficient assignment score (below 50).\n");
      }
   } else {
      printf("Failed due to low attendance (below 75%%).\n");
   }
   return 0;
}
```

OUTPUT

```
Enter attendance percentage (out of 100): 75
Enter assignment score (out of 100): 67
Enter exam score (out of 100): 81
Final Grade: 75.60
Letter Grade: C
```

3. Write a program that uses bitwise operators to perform encryption and decryption of a character.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   char ch, encryptedChar, decryptedChar;
   int key = 6;
   printf("Enter a character to encrypt: ");
   scanf("%c", &ch);
   encryptedChar = ch ^ key;
   printf("Encrypted character: %c\n", encryptedChar);
   decryptedChar = encryptedChar ^ key;
   printf("Decrypted character: %c\n", decryptedChar);
   return 0;
}
```

OUTPUT

```
Enter a character to encrypt: A
Encrypted character: G
Decrypted character: A
```

4. Develop a program that uses logical operators to determine if a person is eligible for a loan based on age, income, and credit score.

SOURCE CODE

```
#include <stdio.h>
int main()
{
   int age;
   double income;
   int creditScore;
   printf("Enter your age: ");
   scanf("%d", &age);
   printf("Enter your annual income (in dollars): ");
   scanf("%lf", &income);
   printf("Enter your credit score: ");
   scanf("%d", &creditScore);
   if ((age >= 18 && age <= 65) && income > 25000 && creditScore >= 650) {
      printf("You are eligible for the loan.\n");
   } else {
      printf("You are not eligible for the loan.\n");
   }
   return 0;
}
```

OUTPUT

```
Enter your age: 18
Enter your annual income (in dollars): 300000
Enter your credit score: 700
You are eligible for the loan.
```