Question 1: Write a program to read 10 integers. Display these numbers by printing three numbers in a line separated by commas.

```c
// 1. Write a program to read 10 integers. Display these numbers by printing three
// numbers in a line separated by commas.

#include <stdio.h>

#define MAX_SIZE 10

void displayIntegers(int arr[], int size);

int main() {
    int array[MAX_SIZE];
    printf("Enter %d Integers:\n", MAX_SIZE);
    for(int i = 0; i < MAX_SIZE; i++) scanf("%d", &array[i]);

    displayIntegers(array, MAX_SIZE);

    return 0;
}

void displayIntegers(int arr[], int size) {
    for (int i = 0; i < size; i++) {
        printf("%d", arr[i]);
        if ((i + 1) % 3 == 0 || i == size - 1) {
            printf("\n");
        } else {
            printf(", ");
        }
    }
}
```

Output

```
Question 1>gcc .\main.c -Wall -o main
Question 1>.\main.exe
Enter 10 Integers:
1 23 2 5 6 87 24 56 78 4
1, 23, 2
5, 6, 87
24, 56, 78
4
Question 1>
```

Question 2: Write a program to print the count of even numbers between 1–200. Also print their sum.

```c
// 2. Write a program to print the count of even numbers between 1-200. Also print their
// sum

#include <stdio.h>

void countAndSumEvenNumbers(int *count, int *sum) {
    *count = 0;
    *sum = 0;
    for (int i = 1; i <= 200; i++) {
        if (i % 2 == 0) {
            (*count)++;
            *sum += i;
        }
    }
}

int main() {
    int count, sum;
    countAndSumEvenNumbers(&count, &sum);
    printf("The Count of even numbers from 1 to 200 is: %d\n", count);
    printf("and their sum is: %d\n", sum);
    return 0;
}
```

Output

```
Question 2>gcc .\main.c -Wall -o main
Question 2>.\main.exe
The Count of even numbers from 1 to 200 is: 100
and thier sum is: 10100
Question 2>
```

Question 3: Write a program to count the number of vowels in a text. (e.g., Enter text: hello world, Output: No. of vowels- 3).

```c
// 3. Write a program to count the number of vowels in a text. (eg: Enter text: hello world,
// Output: No.of vowels- 3 ).


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

#define MAX_LEN 100

int countVowels(char *text) {
    int count = 0;
    while (*text) {
        char c = tolower(*text);
        if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u') {
            count++;
        }
        text++;
    }
    return count;
}

int main() {
    char text[100];
    int i = 0;
    char ch;
    printf("Enter the text: ");
        while (scanf("%c", &ch) == 1 && ch != '\n') {
        if (i < MAX_LEN - 1) {
            text[i++] = ch;
        }
    }
    text[i] = '\0';

    int vowels = countVowels(text);
    printf("The No. of vowels in the text is: %d\n", vowels);

    return 0;
}
```

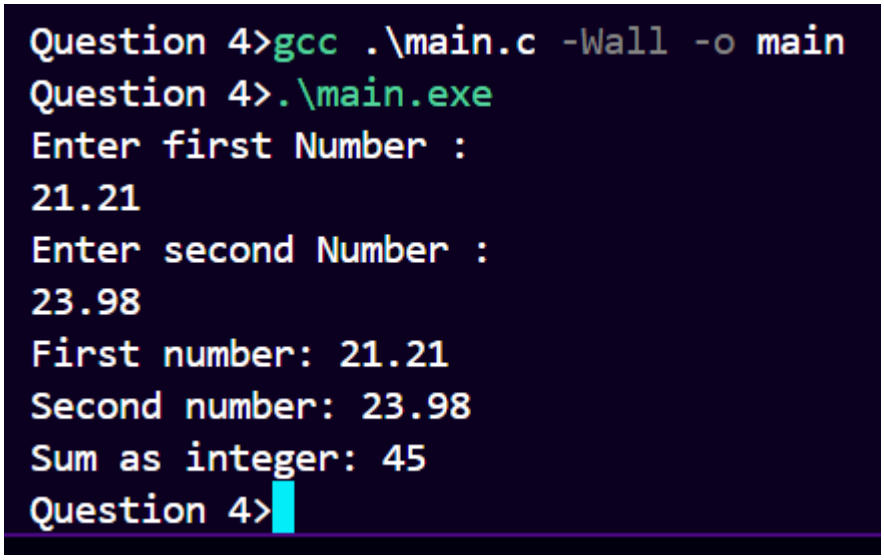
Output

```
Question 3>gcc .\main.c -Wall -o main
Question 3>.\main.exe
Enter the text: my name is mehmood rehan deshmukh
The No. of vowels in the text is: 10
Question 3>
```

Question 4: Write a program to read two floating-point numbers. Add these numbers and assign the result to an integer. Finally, display the value of all three variables.

```c
// 4. Write a program to read two floating point numbers. Add these numbers and assign
// the result to an integer. Finally, display the value of all the three variables.

#include <stdio.h>

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

    printf("Enter first Number : \n");
    scanf("%f", &num1);

    printf("Enter second Number : \n");
    scanf("%f", &num2);

    result = num1 + num2;

    printf("First number: %.2f\n", num1);
    printf("Second number: %.2f\n", num2);
    printf("Sum as integer: %d\n", result);
    return 0;
}
```

Output




Question 5: Write a program to read a floating-point number. Display the rightmost digit of the integral part of the number.

```c
//     5. Write a program to read a floating point number. Display the rightmost digit of the
// integral part of the number.

#include <stdio.h>


int main() {
    float num;
    printf("Enter a floating point number: ");
    scanf("%f", &num);

    int integerPart = (int)num;

    printf("Rightmost digit of the integral part: %d\n", integerPart % 10);

    return 0;
}
```

Output

```
Question 5>gcc .\main.c -Wall -o main
Question 5>.\main.exe
Enter a floating point number: 1242.123
Rightmost digit of the integral part: 2
Question 5>
```

Question 6: Write a program to calculate simple interest and compound interest.

```c
// 6. Write a program to calculate simple interest and compound interest.

#include <stdio.h>
#include <math.h>

float calculateSimpleInterest(float principal, float rate, float period) {
    return (principal * rate * period) / 100;
}

float calculateCompoundInterest(float principal, float rate, float period, int n) {
float amount = principal * pow((1 + rate / (n * 100)), n * period);
return amount - principal;
}

int main() {
    float principal, rate, period;
    int n;

    printf("Enter the principal amount: ");
    scanf("%f", &principal);
    printf("Enter the rate of interest: ");
    scanf("%f", &rate);
    printf("Enter the period in years: ");
    scanf("%f", &period);
    printf("Enter number of times interest applied per year: ");
    scanf("%d", &n);

    float simpleInterest = calculateSimpleInterest(principal, rate, period);
    float compoundInterest = calculateCompoundInterest(principal, rate, period, n);

    printf("The Simple Interest is : %.2f\n", simpleInterest);
    printf("The Compound Interest is : %.2f\n", compoundInterest);

    return 0;
}
```

Output

```
Question 6>gcc .\main.c -Wall -o main
Question 6>.\main.exe
Enter the principal amount: 10000
Enter the rate of interest: 12
Enter the period in years: 10
Enter number of times interest applied per year: 4
The Simple Interest is : 12000.00
The Compound Interest is : 22620.38
Question 6>
```

Question 7: Write a program to calculate the salary of an employee given his basic pay (to be entered by the user), HRA = 10% of the basic pay, TA = 5% of basic pay. Define HRA and TA as constants and use them to calculate the salary of the employee.

```c
// 7. Write a program to calculate salary of an employee given his basic pay (to be
// entered by the user), HRA = 10% of the basic pay, TA = 5% of basic pay. Define
// HRA and TA as constants and use them to calculate the salary of the employee.


#include <stdio.h>

#define HRA 0.10
#define TA 0.05

float calculateSalary(float salary) {
    float hra = salary * HRA;
    float ta = salary * TA;
    return salary + hra + ta;
}

int main() {
    float salary;
    printf("Enter Salary: ");
    scanf("%f", &salary);

    float totalSalary = calculateSalary(salary);

    printf("The base salary is: %.2f\n", salary);
    printf("HRA: %.2f\n", salary * HRA);
    printf("TA: %.2f\n", salary * TA);
    printf("The Total Salary is: %.2f\n", totalSalary);

    return 0;
}
```

Output

```
Question 7>gcc .\main.c -Wall -o main
Question 7>.\main.exe
Enter Salary: 23000
The base salary is: 23000.00
HRA: 2300.00
TA: 1150.00
The Total Salary is: 26450.00
Question 7>
```

Question 8: Write a program to prepare a grocery bill. Enter the name of the items purchased, the quantity in which it is purchased, and its price per unit. Then display the bill in the following format:

********** **********B I L L **********

Item  Quantity Price Amount

_____

Total Amount to be paid =

_____

```c
// 8. Write a program to prepare a grocery bill. Enter the name of the items purchased,
// quantity in which it is purchased, and its price per unit. Then display the bill in the
// following format:
// Quantity
// ************ ******************************B I L L ************************************
// Item
// Price
// Amount
// ____________________________________________________________________
// Total Amount to be paid =
// ____________________________________________________________________


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

#define MAX_ITEMS 12

typedef struct {
    char name[50];
    int quantity;
    float pricePerUnit;
} Item;

void printBill(Item items[], int numItems) {
    float grandTotal = 0;
    printf("\n************ ************************************ B I L L
****************************************\n");
    printf("%-20s %10s %10s %10s\n", "Item", "Quantity", "Price", "Amount");

 printf("_____________________________________________________________________________________\n");

    for (int i = 0; i < numItems; i++) {
        float totalAmount = items[i].quantity * items[i].pricePerUnit;
        printf("%-20s %10d %10.2f %10.2f\n", items[i].name, items[i].quantity,
items[i].pricePerUnit, totalAmount);
        grandTotal += totalAmount;
    }


 printf("_____________________________________________________________________________________\n");
    printf("Total Amount to be paid = %.2f\n", grandTotal);
}

int main() {
    Item items[MAX_ITEMS];
    int numItems;

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

    for (int i = 0; i < numItems; i++) {
        printf("Enter the item name: ");
        scanf("%s", items[i].name);

        int len = strlen(items[i].name);
        if (len > 0 && items[i].name[len - 1] == '\n') {
            items[i].name[len - 1] = '\0';
        }

        printf("Enter the quantity: ");
        scanf("%d", &items[i].quantity);
        printf("Enter the price per unit: ");
        scanf("%f", &items[i].pricePerUnit);
    }

    printBill(items, numItems);

    return 0;
}
```

Output

```
Question 8>gcc .\main.c -Wall -o main
Question 8>.\main.exe
Enter the number of items:
4
Enter the item name: apple
Enter the quantity: 4
Enter the price per unit: 40
Enter the item name: bread
Enter the quantity: 1
Enter the price per unit: 30
Enter the item name: jam
Enter the quantity: 1
Enter the price per unit: 120
Enter the item name: milkshake
Enter the quantity: 4
Enter the price per unit: 25

************ ************************************** B I L L ************************
Item                    Quantity      Price     Amount
--------------------------------------------------------------------------------
apple                          4      40.00     160.00
bread                          1      30.00      30.00
jam                            1     120.00     120.00
milkshake                      4      25.00     100.00
--------------------------------------------------------------------------------
Total Amount to be paid = 410.00
Question 8>
```

Question 9: Write a program to read an integer. Display the value of that integer in decimal, octal, and hexadecimal notation.

```c
// 9. Write a program to read an integer. Display the value of that integer in decimal,
// octal, and hexadecimal notation.

#include <stdio.h>

void displayNotations(int number) {
    printf("Decimal: %d\n", number);
    printf("Octal: %o\n", number);
    printf("Hexadecimal: %X\n", number);
}

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

    displayNotations(number);

    return 0;
}
```

Output

```
Question 9>gcc .\main.c -Wall -o main
Question 9>.\main.exe
Enter an integer: 12
Decimal: 12
Octal: 14
Hexadecimal: C
Question 9>
```

Question 10: Write a program that prints a floating-point value in exponential format with the following specifications:

a. Correct to two decimal places;

b. Correct to four decimal places; and

c. Correct to eight decimal places.

(Expected Output: value entered: 123456.453125 Value in exponent form: 1.234565e+05).

```c
// 10.
// Write a program that prints a floating point value in exponential format with the
// following specifications:
// a. correct to two decimal places;
// b. correct to four decimal places; and
// c. correct to eight decimal places.
// [Expected Output: value entered: 123456.453125 Value in exponent
// form: 1.234565e+05 ]


#include <stdio.h>

void printExponential(float num) {
    printf("2 decimal places: %.2e\n", num);
    printf("4 decimal places: %.4e\n", num);
    printf("8 decimal places: %.8e\n", num);
}

int main() {
    float num;
    printf("Enter a floating point number: ");
    scanf("%f", &num);

    printExponential(num);

    return 0;
}
```

Output

```
Question 10>gcc .\main.c -Wall -o main
Question 10>.\main.exe
Enter a floating point number: 3123.21412422
2 decimal places: 3.12e+003
4 decimal places: 3.1232e+003
8 decimal places: 3.12321411e+003
Question 10>
```

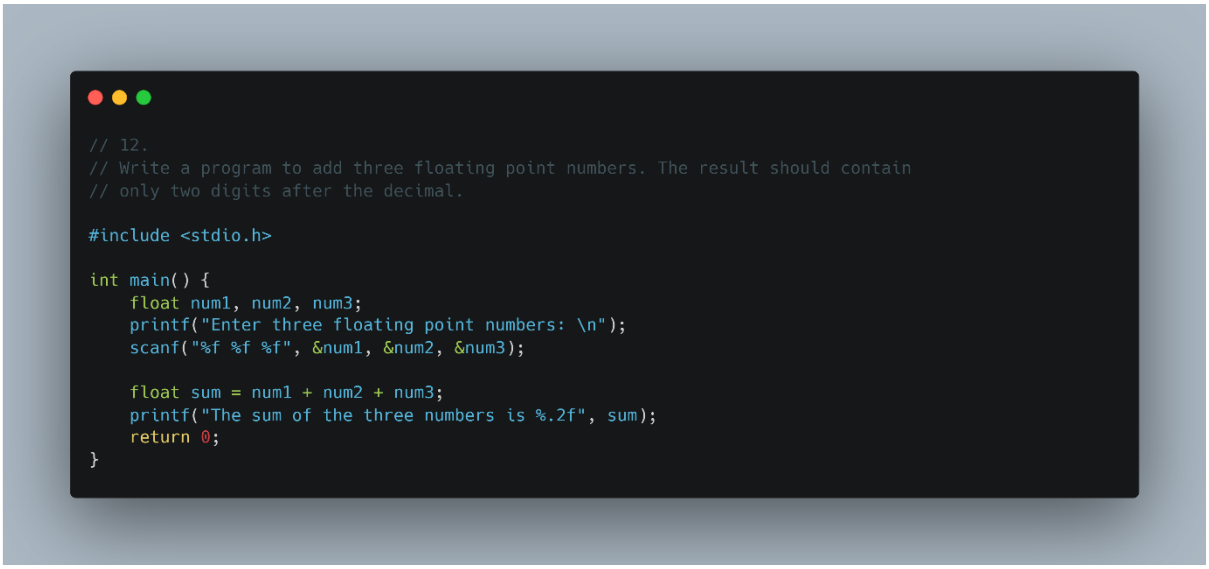
Question 11: Write a program to read a character and print it. Also, print its ASCII value. If the character is in lower case, print it in upper case and vice versa. Repeat the process until a '*' is entered.

```c
// 11.
// Write a program to read a character and print it. Also print its ASCII value. If the
// character is in lower case, print it in upper case and vice versa. Repeat the process
// until a '*' is entered.

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

void processCharacter(char ch) {
    printf("The Character is: %c\n", ch);
    printf("It's ASCII value is: %d\n", (int)ch);

    if (islower(ch)) {
        printf("Uppercase: %c\n", toupper(ch));
    } else if (isupper(ch)) {
        printf("Lowercase: %c\n", tolower(ch));
    } else {
        printf("Character is neither uppercase nor lowercase.\n");
    }
}

int main() {
    char ch;

    while (1) {
        printf("Enter a character (to exit enter *): ");
        scanf(" %c", &ch);

        if (ch == '*') {
            break;
        }

        processCharacter(ch);
    }

    return 0;
}
```

Output:

```
Question 11>gcc .\main.c -Wall -o main
Question 11>.\main.exe
Enter a character (to exit enter *): a
The Character is: a
It's ASCII value is: 97
Uppercase: A
Enter a character (to exit enter *): C
The Character is: C
It's ASCII value is: 67
Lowercase: c
Enter a character (to exit enter *): *
Question 11>
```

Question 12: Write a program to add three floating-point numbers. The result should contain only two digits after the decimal.



```c
// 12.
// Write a program to add three floating point numbers. The result should contain
// only two digits after the decimal.

#include <stdio.h>

int main() {
    float num1, num2, num3;
    printf("Enter three floating point numbers: \n");
    scanf("%f %f %f", &num1, &num2, &num3);

    float sum = num1 + num2 + num3;
    printf("The sum of the three numbers is %.2f", sum);
    return 0;
}
```

Output

```
Question 12>gcc .\main.c -Wall -o main
Question 12>.\main.exe
Enter three floating point numbers:
123.32 423.32 432.98
The sum of the three numbers is 979.62
Question 12>
```

Question 13: Write a program to take input from the user and then check whether it is a number or a character. If it is a character, determine whether it is in upper case or lower case. Also, print its ASCII value.

```c
// 13.
// Write a program to take input from the user and then check whether it is a
// number or a character. If it is a character, determine whether it is in upper case or
// lower case. Also print its ASCII value.

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

void checkInput(char ch) {
    if (isdigit(ch)) {
        printf("The input is a number.\n");
    } else if (isalpha(ch)) {
        if (isupper(ch)) {
            printf("The input is an uppercase letter.\n");
        } else {
            printf("The input is a lowercase letter.\n");
        }
        printf("ASCII value: %d\n", ch);
    } else {
        printf("The input is neither a number nor a letter.\n");
    }
}

int main() {
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    checkInput(ch);
    return 0;
}
```

Output

```
Question 13>gcc .\main.c -Wall -o main
Question 13>.\main.exe
Enter a character: A
The input is an uppercase letter.
ASCII value: 65
Question 13>
```

Question 14: Write a program to display the sum and average of numbers from 1 to n. Use a for loop.

```c
// 14.
// Write a program to display sum and average of numbers from 1 to n. Use for
// loop.

#include <stdio.h>
void displaySumAndAverage(int n);

int main() {
    int n = 50;
    displaySumAndAverage(n);
    return 0;
}


void displaySumAndAverage(int n){
    int sum = 0, average, i;
    for(i = 1; i <= n; i++){
        sum+= i;
    }

    average = sum / n;

    printf("The sum of numbers from 1 to %d is %d\n", n, sum);
    printf("The Average of numbers from 1 to %d is %d\n", n, average);
}
```

Output

```
Question 14>gcc .\main.c -Wall -o main
Question 14>.\main.exe
The sum of numbers from 1 to 50 is 1275
The Average of numbers from 1 to 50 is 25
Question 14>
```

Question 15: Write a program to print all odd numbers from m to n.

```c
// 15. The Average of numbers from 1 to 50

#include <stdio.h>

void printOdd(int start, int end);
int main( ) {
    int m = 1;
    int n = 50;
    printOdd(m, n);
    return 0;
}


void printOdd(int start, int end){
    int i;
    for(i = start; i <= end; i++){
        if(i % 2 != 0) printf("%d ", i);
    }
}
```

Output

```
Question 15>gcc .\main.c -Wall -o main
Question 15>.\main.exe
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49
Question 15>
```

Question 16: Write a program to print all prime numbers from m to n.

```c
// 16. Write a program to print all prime numbers from m to n.

#include <stdio.h>

void printPrime(int start, int end);
int isPrime(int num);

int main() {
    int m = 1;
    int n = 50;
    printPrime(m, n);
    return 0;
}

int isPrime(int num) {
    if (num <= 1) return 0;
    for (int i = 2; i*i <= num; i++) {
        if (num % i == 0) return 0;
    }
    return 1;
}

void printPrime(int start, int end){
    int i;
    for(i = start; i <= end; i++){
        if(isPrime(i)) printf("%d ", i);
    }
}
```

Output

```
Question 16>gcc .\main.c -Wall -o main
Question 16>.\main.exe
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47
Question 16>
```

Question 17: Write a program to read numbers until –1 is entered and display whether it is an Armstrong number or not.

```c
// 17. Write a program to read numbers until –1 is entered and display whether it is
// an Armstrong number or not.

#include <stdio.h>
#include <math.h>
int isArmstrong(int num);

int main() {
        int num;
    while (1) {
        printf("Enter a number (to exit enter -1): ");
        scanf("%d", &num);

        if (num == -1) break;

        if (isArmstrong(num)) {
            printf("%d is an Armstrong number.\n", num);
        } else {
            printf("%d is not an Armstrong number.\n", num);
        }
    }
    return 0;
}

int isArmstrong(int num) {
    int temp = num, length = 0;
    float sum = 0;
    while (temp != 0) {
        temp /= 10;
        length++;
    }
    temp = num;

    while (temp != 0) {
        int digit = temp % 10;
        sum += pow(digit, length);
        temp /= 10;
    }

    return ((int)sum == num);
}
```

Output

```
Question 17>gcc .\main.c -Wall -o main
Question 17>.\main.exe
Enter a number (to exit enter -1): 153
153 is an Armstrong number.
Enter a number (to exit enter -1): 125
125 is not an Armstrong number.
Enter a number (to exit enter -1): -1
Question 17>
```

Question 18: The wind chill index (WCI) is calculated from the wind speed

Write a program that can calculate the wind chill index.

```c
// 18. The wind chill index (WCI) is calculated from the wind speed v in miles per hour
// and the temperature t in Fahrenheit. Three formulas are used, depending on the
// wind speed:
// if (0 <= v <= 4) then WCI = t
// if (v >=45) then WCI = 1.6t - 55
// otherwise, WCI = 91.4 + (91.4 - t)(0.0203v - 0.304(v)1/2 - 0.474).
// Write a program that can calculate the wind chill index.

#include <stdio.h>
#include <math.h>

double calculateWCI(double v, double t) {
    double WCI;
    if (v >= 0 && v <= 4) {
        WCI = t;
    } else if (v >= 45) {
        WCI = 1.6 * t - 55;
    } else {
        WCI = 91.4 + (91.4 - t) * (0.0203 * v - 0.304 * sqrt(v) - 0.474);
    }
    return WCI;
}

int main() {
    double v, t;
    printf("Enter wind speed: ");
    scanf("%lf", &v);
    printf("Enter temperature: ");
    scanf("%lf", &t);

    double WCI = calculateWCI(v, t);
    printf("The Wind Chill Index is: %.2f\n", WCI);
    return 0;
}
```

Output

```
Question 18>gcc .\main.c -Wall -o main
Question 18>.\main.exe
Enter wind speed: 123
Enter temperature: 35
The Wind Chill Index is: 1.00
Question 18>
```

Question 19: Write a program that asks the user to enter an integer and determines whether it is divisible by 5 and 6, whether it is divisible by 5 or 6, and whether it is divisible by 5 or 6 but not both. For example, if your input is 10, the output should be:

Is 10 divisible by 5 and 6? false

Is 10 divisible by 5 or 6? true

Is 10 divisible by 5 or 6, but not both? True

```c
// 19.
// Write a program that asks the user to enter an integer and determines whether
// it is divisible by 5 and 6, whether it is divisible by 5 or 6, and whether it is divisible
// by 5 or 6 but not both. For example, if your input is 10, the output should be:
// Is 10 divisible by 5 and 6? false
// Is 10 divisible by 5 or 6? true
// Is 10 divisible by 5 or 6, but not both? True

#include <stdio.h>

void checkDivisibility(int num);

int main() {
    int num;
    printf("Enter an integer: ");
    scanf("%d", &num);
    checkDivisibility(num);
    return 0;
}

void checkDivisibility(int num) {
    int isdivisibleBy5 = (num % 5 == 0);
    int isdivisibleBy6 = (num % 6 == 0);

    printf("Is %d divisible by 5 and 6? %s\n", num, (isdivisibleBy5 && isdivisibleBy6) ? "true" :
"false");
    printf("Is %d divisible by 5 or 6? %s\n", num, (isdivisibleBy5 || isdivisibleBy6) ? "true" :
"false");
    printf("Is %d divisible by 5 or 6, but not both? %s\n", num, (isdivisibleBy5 != isdivisibleBy6)
? "true" : "false");
}
```

Output

```
Question 19>gcc .\main.c -Wall -o main
Question 19>.\main.exe
Enter an integer: 45
Is 45 divisible by 5 and 6? false
Is 45 divisible by 5 or 6? true
Is 45 divisible by 5 or 6, but not both? true
Question 19>
```

Question 20: McDonald's wants you to write a program to take orders from the Internet. Your program asks for the item, its price, and if overnight shipping is wanted. Regular shipping for items under Rs.100 is Rs.20.00; for items Rs.100 or more, shipping is Rs.30.00. For overnight delivery, add Rs.50.00. For example, the output might be:

Enter the item: Burger

Enter the price: 450

Overnight delivery (0==no, 1==yes): 1

Invoice: Burger Rs.450, shipping Rs.80, total Rs.530.

```c
// 20.
// McDonald's  wants you to write a program to take orders from the Internet. Your
// program asks for the item, its price, and if overnight shipping is wanted. Regular
// shipping for items under Rs.100 is Rs20.00; for items Rs100 or more shipping is
// Rs30.00. For overnight delivery add Rs50.00. For example, the output might be:
// Enter the item: Burger Enter the price: 450 Overnight delivery (0==no, 1==yes): 1
// Invoice: Burger Rs.450 shipping Rs.80 total Rs. 530.

#include <stdio.h>

void calculateInvoice(char item[], float price, int overnight);

int main() {
    char item[50];
    float price;
    int overnight;

    printf("Enter the item: ");
    scanf("%s", item);
    printf("Enter the price of the Item: ");
    scanf("%f", &price);
    printf("Do you want an Overnight delivery ? (0==no, 1==yes): ");
    scanf("%d", &overnight);

    calculateInvoice(item, price, overnight);
    return 0;
}

void calculateInvoice(char item[], float price, int overnight) {
    float shipping;
    if (price < 100) {
        shipping = 20.0;
    } else {
        shipping = 30.0;
    }

    if (overnight) {
        shipping += 50.0;
    }

    float total = price + shipping;
    printf("Invoice:\n%s Rs.%.2f\nShipping Rs.%.2f\nTotal Rs.%.2f\n", item, price, shipping, total);
}
```

Output

```
Question 20>gcc .\main.c -Wall -o main
Question 20>.\main.exe
Enter the item: burger
Enter the price of the Item: 120
Do you want an Overnight delivery ? (0==no, 1==yes): 1
Invoice:
burger Rs.120.00
Shipping Rs.80.00
Total Rs.200.00
Question 20>
```