1. Write a C program to determine if the given number is odd or even using Bitwise operators.

```
#include <stdio.h>
int main() {
    int num;
    printf("Enter a number: ");
    scanf("%d", &num);
    if (num & 1) {
        printf("%d is an odd number\n", num);
    } else {
        printf("%d is an even number\n", num);
    }
    return 0;
}
```

OUTPUT

2. Write a C program to count the number of bits set in a number.

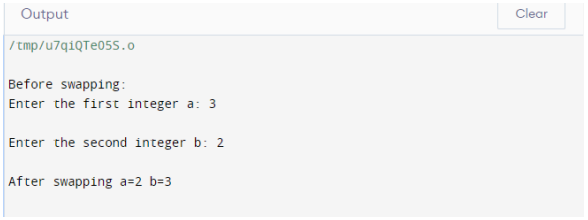
```
#include <stdio.h>
int main() {
    int num, count=0;
    printf("Enter a number: ");
    scanf("%d", &num);
    while (num) {
        count += num & 1;
        num >>= 1;
    }
    printf("Count of Set bits: %d\n", count);

    return 0;
}
```

OUTPUT

3. Write a C program to swap two numbers. Use a function pointer to do this operation.

```
#include <stdio.h>
int swap(int *a, int *b) {
   int temp = *a;
   *a = *b;
   *b = temp;
   return *a,*b;
}
int main() {
   int a, b;
   printf("\nBefore swapping: ");
   printf("\nEnter the first integer a: ");
   scanf("%d", &a);
   printf("\nEnter the second integer b: ");
   scanf("%d", &b);
   swap(&a, &b);
   printf("\nAfter swapping a=%d b=%d", a, b);
   return 0;
}
```

OUTPUT



4. Write an equivalent pointer expression for fetching the value of array element a[i][j][k][2]

ANSWER

((*(*(a + i) + j) + k) + 2)

- a is a pointer and i , j , k , l are offset values.
- int ptr = a + i where a is Base address and i is Offset, now it gives the address of a[i] which is in integer form.
- Hence we will it into address as *(a+i) and then add it with the 2-nd offset i.e. j -> *(a+i)+j.
- Similarly The Process Continues as Follows:

- Address = *(a+i)+j Offset = k
- new Address = (*(*(a+i)+j)+k)
- Address = *(*(a+i)+j)+k Offset = l
- new Address = *(*(*(a+i)+j)+k)+l

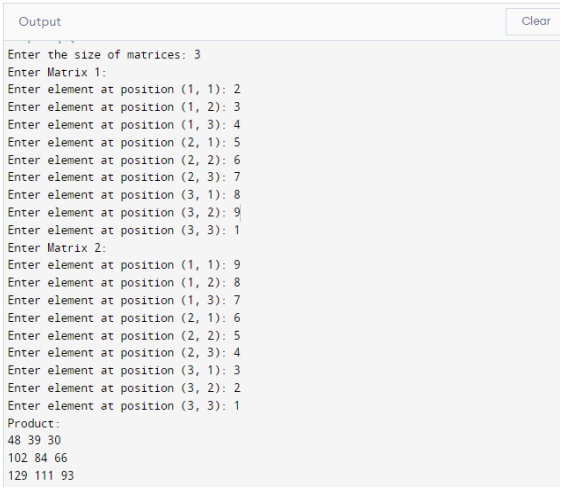
And Then Finally The Address Of The Element a[i][j][k][l] = *(*(*(*(a+i)+j)+k)+l).

5. Write a C program to Multiply two matrix (n*n) using pointers.

```
#include<stdio.h>
void multiplyMatrices(int n, int (*mat1)[n], int (*mat2)[n], int (*result)[n]) {
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            result[i][j] = 0;
            for (int k = 0; k < n; k++) {
                result[i][j] += *(*(mat1 + i) + k) * *(*(mat2 + k) + j);
            }
        }
    }
}
void displayMatrix(int n, int (*matrix)[n]) {
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            printf("%d ", *(*(matrix + i) + j));
        }
        printf("\n");
    }
}
int main() {
    int n;
    printf("Enter the size of matrices: ");
    scanf("%d", &n);
    int matrix1[n][n], matrix2[n][n], result[n][n];
    printf("Enter Matrix 1:\n");
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            printf("Enter element at position (%d, %d): ", i + 1, j + 1);
            scanf("%d", &matrix1[i][j]);
        }
    }
    printf("Enter Matrix 2:\n");
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            printf("Enter element at position (%d, %d): ", i + 1, j + 1);
            scanf("%d", &matrix2[i][j]);
```

```
        }
    }
    multiplyMatrices(n, matrix1, matrix2, result);
    printf("Product:\n");
    displayMatrix(n, result);
    return 0;
}
```

OUTPUT



6. Find the output of the following // Consider the compiler is 32-bit machine

```
#include <stdio.h>
typedef struct
{
int A;
char B;
char C;
} InfoData;
int main(int argc, char *argv[])
{ //Calculate size of structure
printf("\n Size of Structure = %d\n\n",sizeof(InfoData));
return 0;
}
```

ANSWER

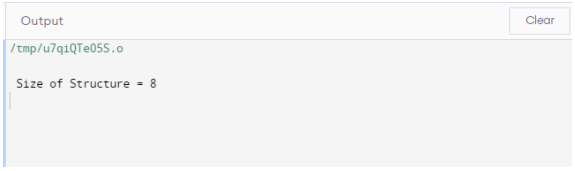
In this example, the output indicates that the size of the InfoData structure is 8 bytes. The breakdown of the size is as follows:

- int A takes 4 bytes (on a typical 32-bit machine).
- char B takes 1 byte.

- char C takes 1 byte.
- The compiler may add 2 bytes of padding to align the structure.

So, the total size is 4 + 1 + 1 + 2 = 8 bytes. The size of a structure depends on the size and alignment requirements of its individual members.

OUTPUT



7. Find the output of the following // Consider the compiler is 32-bit machine

```
#include <stdio.h>

typedef struct {
   char A;
   double B;
   char C;
} InfoData;

int main(int argc, char *argv[]) {
   // Calculate size of structure
   printf("\n Size of Structure = %d\n\n", sizeof(InfoData));
   return 0;
}
```

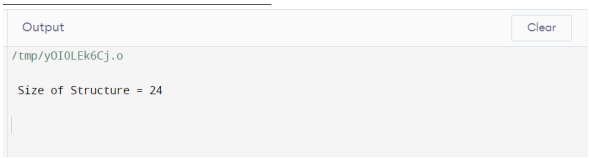
ANSWER

In InfoData structure (on a typical 32-bit machine).

char A takes 1 bytes
Padding after char A to ensure alignment for double B takes 7 bytes
double B takes 8 byte.
char C takes 1 byte.
Additional padding to ensure overall structure alignment takes 7 bytes

Summing these up is 1 + 7 + 8 + 1 + 7 = 24 bytes.

OUTPUT



8. Find the output of the following // Consider the compiler is 32-bit machine

```
#include <stdio.h>
#include <stdint.h>
int main(){
unsigned int var = 0x12345678;
unsigned int rev = 0;
for (int i = 0; i < 8; i++){
rev = (rev << 4) | ((var >> (4*i)) & 0xF);
}
printf("%x", rev);
return 0;
}
```

OUTPUT

In each iteration, the value of rev is shifted left by 4 bits, and a new set of 4 bits is extracted from var and combined with the existing rev. This process is repeated for 8 iterations, resulting in the reversed value 0x87654321.