ASSIGNMENT 4

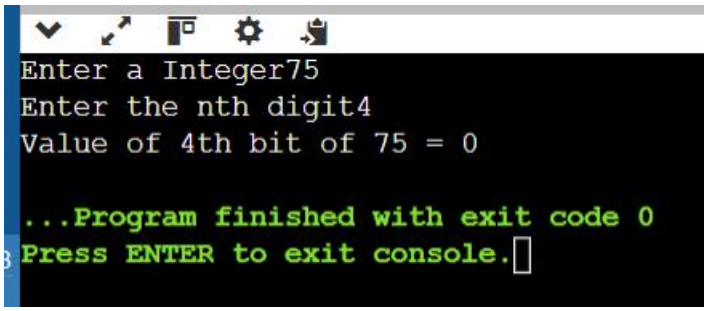
1. Write a C program to determine if the least significant bit of a given integer is set (i.e., check if the number is odd).

```
#include<stdio.h>
int main(){
   int a= 13;
   if ((a & 1) == 1){
      printf("Number is Odd");
   }
   else{
      printf("Number is Even");
   }
   return 0;
}
```

2. Create a C program that retrieves the value of the nth bit from a given integer.

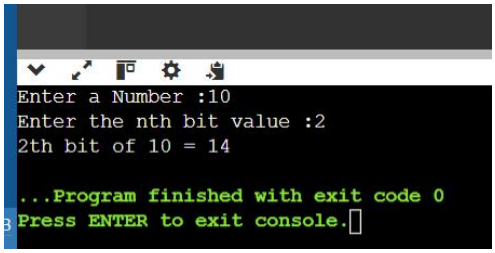
```
#include<stdio.h>

int main(){

   int num,n;

   printf("Enter a Integer");

   scanf("%d",&num);

   printf("Enter the nth digit");

   scanf("%d",&n);

   if (((num>>n)&1)==1){

      printf("Value of %dth bit of %d = 1 ",n,num);

   }
```

```
    else{
        printf("Value of %dth bit of %d = 0 ",n,num);
    }
    return 0;
}
```



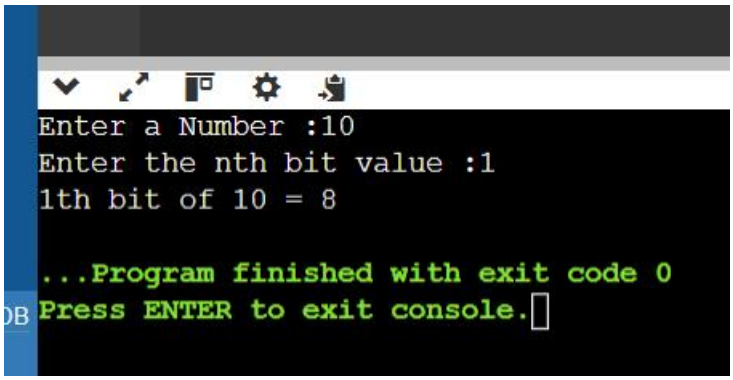
3. Develop a C program that sets the nth bit of a given integer to 1.

```
#include<stdio.h>
int main(){
    int num,n;
    int mask,result;
    printf("Enter a Number :");
    scanf("%d",&num);
    printf("Enter the nth bit value :");
    scanf("%d",&n);
    mask=1<<n;
    result=num|mask;
    printf("%dth bit of %d = %d",n,num,result);
}
```



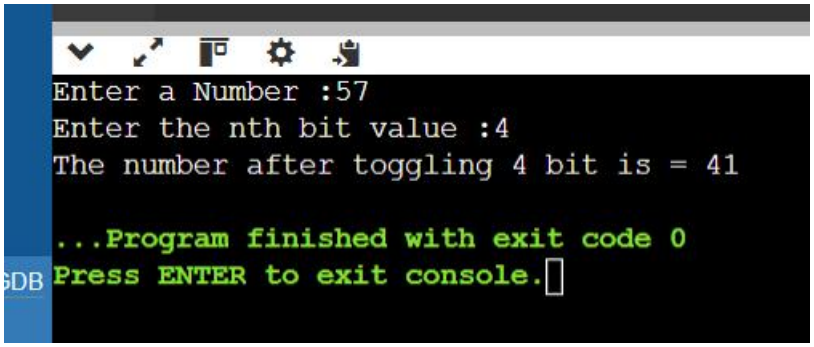
4. Write a C program that clears (sets to 0) the nth bit of a given integer.

```
#include<stdio.h>

int main(){

   int num,n;

   int mask,result;

   printf("Enter a Number :");

   scanf("%d",&num);

   printf("Enter the nth bit value :");

   scanf("%d",&n);

   mask=1<<n;

   mask=~(mask);

   result=num&mask;

   printf("%dth bit of %d = %d",n,num,result);

}
```



5. Create a C program that toggles the nth bit of a given integer.

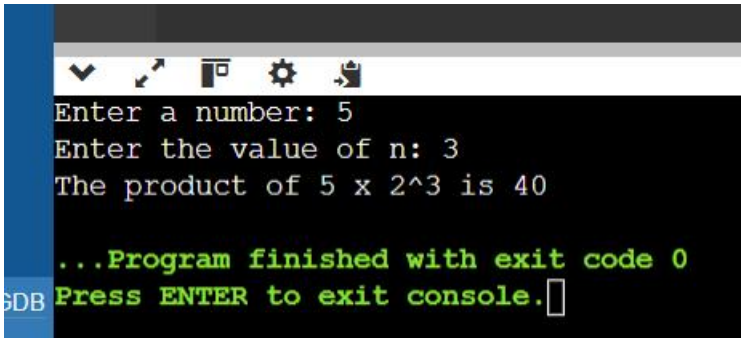
```
#include<stdio.h>

int main(){

   int num,n;

   int mask,result;

   printf("Enter a Number :");

   scanf("%d",&num);

   printf("Enter the nth bit value :");

   scanf("%d",&n);

   mask=1<<n;

   result=num^mask;

   printf("The number after toggling %d bit is = %d",n,result);

}
```



6. Write a C program that takes an integer input and multiplies it by 2^n using the left shift operator.

```
#include <stdio.h>

int main() {

   int num, n;

   printf("Enter a number: ");

   scanf("%d", &num);
```

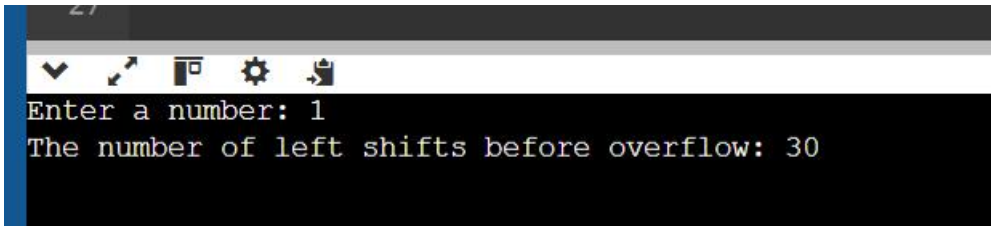
```
    printf("Enter the value of n: ");
    scanf("%d", &n);
    printf("The Product of %d x 2^%d is %d", num, n, num << n);
    return 0;
}
```



7. Create a C program that counts how many times you can left shift a number before it overflows (exceeds the maximum value for an integer).

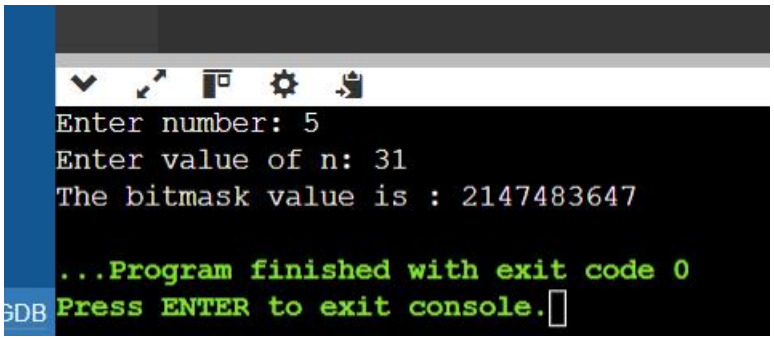
```
 #include <stdio.h>
#include <limits.h>
int main() {
    int num, count = 0;
    printf("Enter a number: ");
    scanf("%d", &num);
    while (num <= INT_MAX / 2) {
        num <<= 1;
        count++;
    }
    printf("The number of left shifts before overflow: %d\n", count);
```

```
    return 0;
}
```



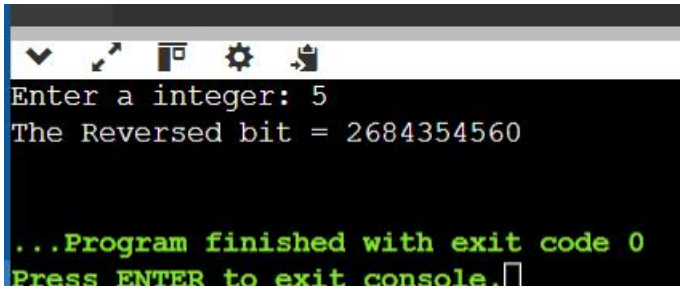
8. Write a C program that creates a bitmask with the first n bits set to 1 using the left shift operator.

```
#include <stdio.h>

int main() {
    int num, n;
    printf("Enter number: ");
    scanf("%x", &num);
    printf("Enter value of n: ");
    scanf("%d", &n);
    int bitmask = (1 << n) - 1;
    printf("The bitmask value is : %d", bitmask);
    return 0;
}
```



9.Develop a C program that reverses the bits of an integer using left shift and right shift operations.

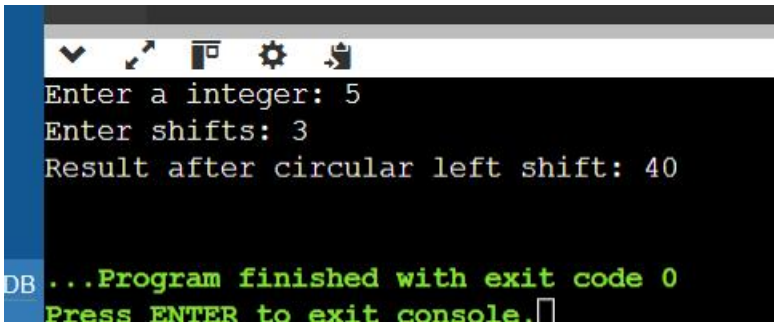
```
#include <stdio.h>

int main() {
   unsigned int num, reverse_bit = 0;
   printf("Enter a integer: ");
   scanf("%u", &num);
   for (int i = 0; i < 32; i++) {
      reverse_bit = (reverse_bit << 1) | (num & 1);
      num = num >> 1;
   }
   printf("The Reversed bit = %u\n", reverse_bit);
   return 0;
}
```



10. Create a C program that performs a circular left shift on an integer.

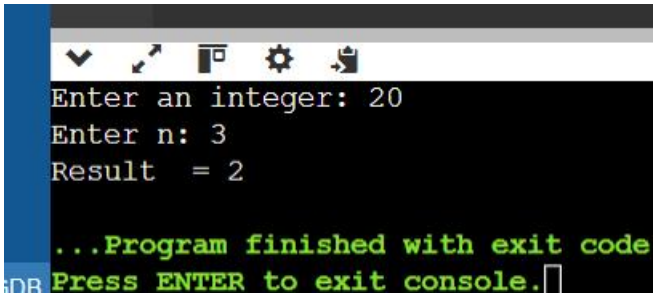
```
#include <stdio.h>

int main() {
   unsigned int num, shifts,result;
   printf("Enter a integer: ");
   scanf("%u", &num);
   printf("Enter shifts: ");
   scanf("%u", &shifts);
```

```
    result = (num << shifts) | (num >> (32 - shifts));
    printf("Result after circular left shift: %u\n", result);
    return 0;
}
```



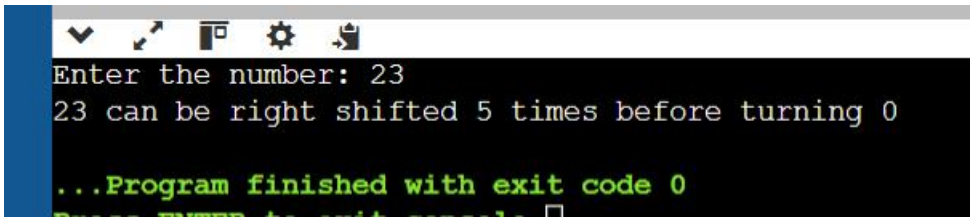
11. Write a C program that takes an integer input and divides it by 2^ n using the right shift operator.

```
#include <stdio.h>
int main() {
    int num, n, out;
    printf("Enter an integer: ");
    scanf("%d", &num);
    printf("Enter n: ");
    scanf("%d", &n);
    out = num >> n;
    printf("Result  = %d", out);
    return 0;
}
```



12. Create a C program that counts how many times you can right shift a number before it becomes zero.

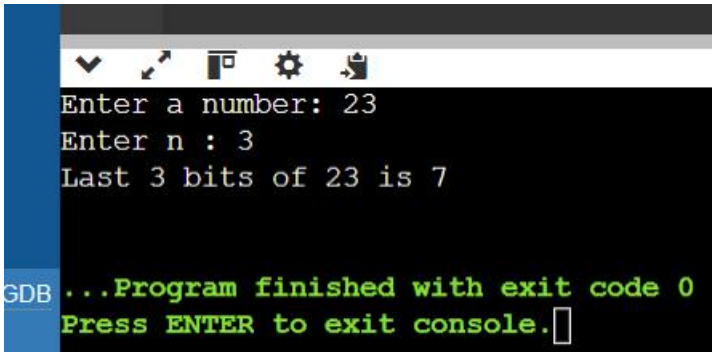
```
#include <stdio.h>

int main() {

   unsigned int num, count = 0;

   printf("Enter the number: ");

   scanf("%d", &num);

   int out = num;

   while (num > 0) {

      num >>= 1;

      ++count;

   }

   printf("%d can be right shifted %d times before turning 0", out, count);

   return 0;

}
```



13. Write a C program that extracts the last n bits from a given integer using the right shift operator.

```
#include <stdio.h>
```

```
int main() {
    int num, n, result;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Enter n : ");
    scanf("%d", &n);
    result = num & ((1 << n) - 1);
    printf("Last %d bits of %d is %d\n",n,num,result);
    return 0;
}
```



13. Develop a C program that uses the right shift operator to create a bitmask that checks if specific bits are set in an integer.

```
#include <stdio.h>
int main() {
    int num, n;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Enter the bit position : ");
    scanf("%d", &n);
```

```
    if ((num >> n) & 1) {
        printf("Bit %d is set as 1\n", n);
    } else {
        printf("Bit %d is not set as 0\n", n);
    }
    return 0;
}
```