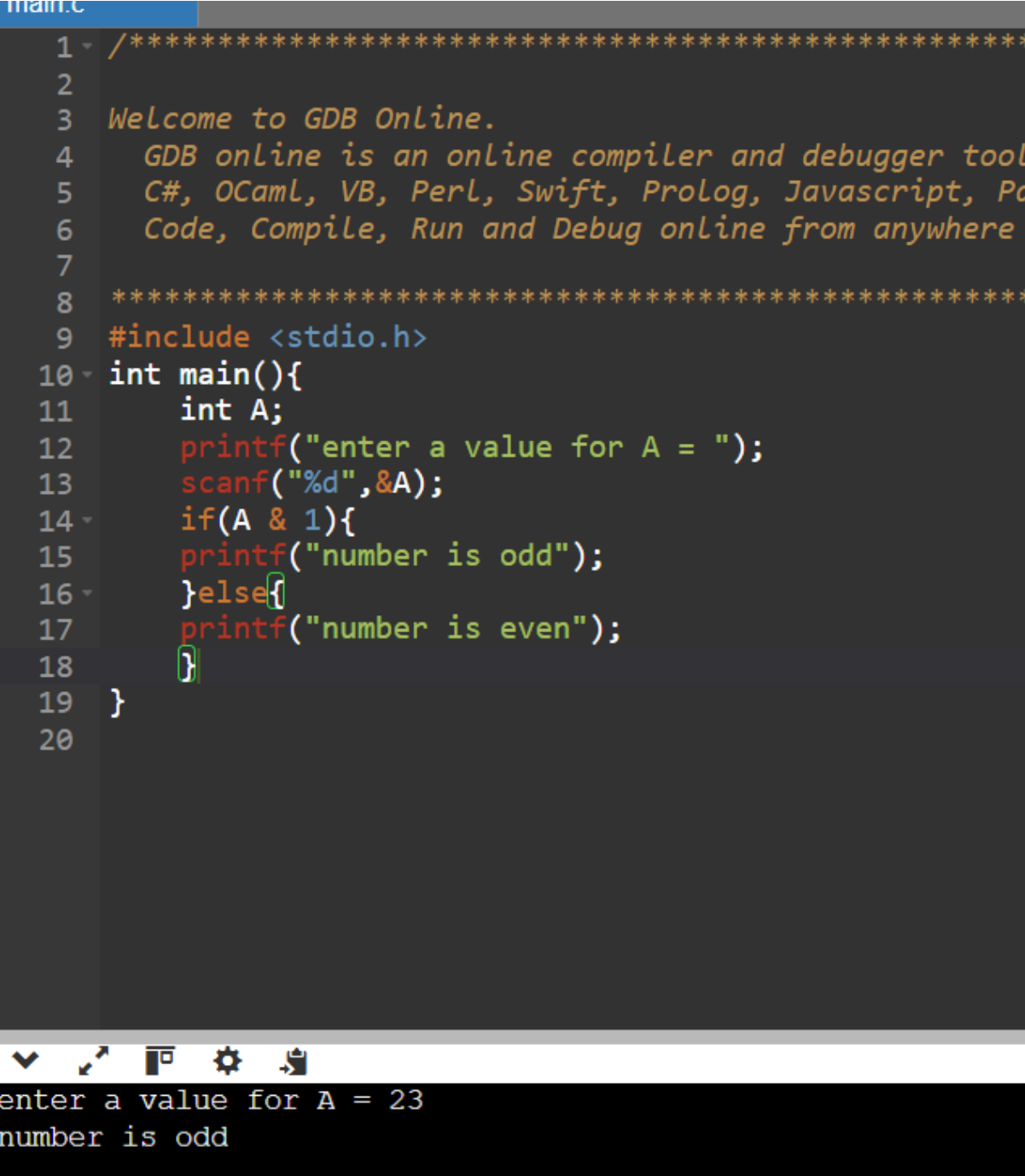


1. Write a C program to determine if the least significant bit of a given integer is set (i.e., check if the number is odd).

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger tool
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pa
6  Code, Compile, Run and Debug online from anywhere
7
8  *****/
9  #include <stdio.h>
10 int main(){
11     int A;
12     printf("enter a value for A = ");
13     scanf("%d",&A);
14     if(A & 1){
15         printf("number is odd");
16     }else{
17         printf("number is even");
18     }
19 }
20
```



enter a value for A = 23  
number is odd

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

```
main.c
1  /*****
2
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5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pa
6  Code, Compile, Run and Debug online from anywhere
7
8  *****/
9  #include <stdio.h>
10 int main(){
11     int A,n;
12     printf("enter a value for A = ");
13     scanf("%d",&A);
14     printf("enter the nth position ");
15     scanf("%d",&n);
16
17     if (A & (1 << n)) {
18         printf("The %d th bit is 1\n", n);
19     } else {
20         printf("The %d th bit is 0\n", n);
21     }
22
23     return 0;
24 }
25
```

enter a value for A = 45  
enter the nth position 6  
The 6 th bit is 0

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

main.c

```
1  /******
2
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4  GDB online is an online compiler and debugger tool for
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pascal
6  Code, Compile, Run and Debug online from anywhere in
7
8  *****/
9  #include <stdio.h>
10 int main(){
11     int A,n;
12     printf("enter a value for A = ");
13     scanf("%d",&A);
14     printf("enter the nth position ");
15     scanf("%d",&n);
16
17     A = A | (1 << n);
18     printf("The %d th bit is updated as 1\n", n);
19     printf("updated value = %d\n",A);
20
21     return 0;
22 }
23
```



```
enter a value for A = 34
enter the nth position 4
The 4 th bit is updated as 1
updated value = 50
```

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

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger tool for C, C++, Python, PHP, R
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pascal, COBOL, HTML, CSS, JS
6  Code, Compile, Run and Debug online from anywhere in world.
7
8  *****/
9  #include <stdio.h>
10 int main(){
11     int A,n;
12     printf("enter a value for A = ");
13     scanf("%d",&A);
14     printf("enter the nth position ");
15     scanf("%d",&n);
16
17     int mask = ~(1<<n);
18     A = A & mask;
19     printf("The %d th bit is cleared and updated value of A = %d\n", n,A);
20
21     return 0;
22 }
23
```

input

```
enter a value for A = 54
enter the nth position 4
The 4 th bit is cleared and updated value of A = 38
```

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

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger tool
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, PHP,
6  Code, Compile, Run and Debug online from anywhere
7
8  *****/
9  #include <stdio.h>
10 int main(){
11     int A,n;
12     printf("enter a value for A = ");
13     scanf("%d",&A);
14     printf("enter the nth position ");
15     scanf("%d",&n);
16
17     A = A ^ (1 << n);
18     printf("After toggling A = %d\n",A);
19
20     return 0;
21 }
22
```

enter a value for A = 55  
enter the nth position 5  
After toggling A = 23

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

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger tool for C, C++, Python, PHP, R
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pascal, COBOL, HTML, CSS, JS
6  Code, Compile, Run and Debug online from anywhere in world.
7
8  *****/
9  #include <stdio.h>
10
11 int main() {
12     int num, n, out;
13
14     printf("Enter an integer: ");
15     scanf("%d", &num);
16
17     printf("enter value of n : ");
18     scanf("%d", &n);
19
20     out = num << n;
21
22     printf("The result of %d * 2^%d is: %d\n", num, n, out);
23
24     return 0;
25 }
```

input

Enter an integer: 267  
enter value of n : 2  
The result of 267 \* 2^2 is: 1068

2. 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).

```
main.c
6 Code, compile, run and debug online from anywhere in world.
7
8 *****/
9 #include <stdio.h>
10 #include <limits.h>
11
12 #include <stdio.h>
13
14 int count(int num) {
15     int count = 0;
16     while (num != 0) {
17         num <<= 1;
18         count++;
19     }
20     return count;
21 }
22
23 int main() {
24     int num;
25
26     printf("Enter a number: ");
27     scanf("%d", &num);
28
29     int shifts = count(num);
30
31     printf("The number can be left shifted %d times before it overflows.\n", shifts);
32
33     return 0;
34 }
```

input

Enter a number: 45

The number can be left shifted 32 times before it overflows.

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

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript
6  Code, Compile, Run and Debug online from anyw
7
8  *****/
9  #include <stdio.h>
10
11 int main() {
12     int n, bitmask;
13
14     printf("Enter value of n: ");
15     scanf("%d", &n);
16
17     bitmask = (1 << n) - 1;
18
19     printf("output is %d\n",bitmask);
20 }
```

Enter value of n: 3  
output is 7

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



```
main.c
1  #include <stdio.h>
2
3  int reverse_bits( int num) {
4      int reverse = 0;
5      int count = sizeof(num) * 8;
6      for (int i = 0; i < count; i++) {
7          reverse <<= 1;
8          reverse |= (num & 1);
9          num >>= 1;
10     }
11
12     return reverse;
13 }
14
15 int main() {
16     int num;
17     printf("Enter a number: ");
18     scanf("%u", &num);
19     int reverse = reverse_bits(num);
20     printf("Original number: %u\n", num);
21     printf("Reversed number: %u\n", reverse);
22
23     return 0;
24 }
```

Enter a number: 45  
Original number: 45  
Reversed number: 3019898880

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

```
main.c
1  /*****
2
3  Welcome to GDB Online.
4  GDB online is an online compiler and debugger tool for C, C++, P
5  C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pascal, COBOL, H
6  Code, Compile, Run and Debug online from anywhere in world.
7
8  *****/
9  #include <stdio.h>
10
11 int main() {
12     int num, n , out;
13     printf("Enter an integer: ");
14     scanf("%d", &num);
15     printf("Enter n ");
16     scanf("%d", &n);
17
18     out = num >> n;
19
20     printf("Result of %d divided by 2^%d = %d\n", num, n, out);
21     return 0;
22 }
```

input

```
Enter an integer: 20
Enter n 3
Result of 20 divided by 2^3 = 2
```

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

```
main.c
2
3 Welcome to GDB Online.
4 GDB online is an online compiler and debugger tool for
5 C#, OCaml, VB, Perl, Swift, Prolog, Javascript, Pascal,
6 Code, Compile, Run and Debug online from anywhere in wo
7
8 *****
9 #include <stdio.h>
10 #include <stdint.h>
11
12 int rightshift(uint16_t num) {
13     int count = 0;
14     while (num != 0) {
15         num >>= 1;
16         count++;
17     }
18     return count;
19 }
20
21 int main() {
22     uint16_t num1 = 1234;
23     printf("Original num1 = %u\n", num1);
24
25     int shifts = rightshift(num1);
26     printf("Number of right shifts : %d\n", shifts);
27
28     return 0;
29 }
```

Original num1 = 1234  
Number of right shifts : 11

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

main.c

```
5 C#, Ocaml, VB, Perl, Swift, Prolog, Javascript, Pascal, COBOL, HTML,  
6 Code, Compile, Run and Debug online from anywhere in world.  
7  
8 *****  
9 #include <stdio.h>  
10 #include <stdint.h>  
11  
12 uint16_t lastbits(uint16_t num, int n) {  
13     uint16_t mask = (1 << n) - 1;  
14  
15     return num & mask;  
16 }  
17  
18 int main() {  
19     uint16_t num;  
20     int n;  
21  
22     printf("Enter a number: ");  
23     scanf("%d", &num);  
24     printf("Enter the number of bits to extract: ");  
25     scanf("%d", &n);  
26  
27     uint16_t last_n_bits = lastbits(num, n);  
28  
29     printf("Last %d bits of %hu are: %hu\n", n, num, last_n_bits);  
30  
31     return 0;  
32 }
```

input

```
| %hd  
Enter a number: 23  
Enter the number of bits to extract: 3  
Last 3 bits of 23 are: 7
```