Department of Electrical and Computer Engineering
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ECE160: Foundations of Computer Engineering I (Spring 2023)
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LAB # 5 Solution
(Relevant Lecture: #2-#10)

1. **Write down the output of each printf() in the following program first.** Then check your results by compiling and running this program. **Do think about and understand the answers!!**

```c
#include <stdio.h>
void main(void)
{
    int a = 7;
    int b = 3;
    int c = 2;
    float d = 4.0;
    float e = 0;
    int g = 0;

    printf("%d\n", b % a * c);

    e = (float)(a / b) + c / d;
    printf("%4.2f\n", e);

    e = (float)a / (b - 1) * 2 + d;
    printf("%f\n", e);

    printf("%d\n", a && b);

    printf("%d\n", !a || !b);

    b = ++a;
    printf("%d\n", b);

    printf("%d\n", a * c);

    g = --a * (2 + c) / 2 - c++ * b;
    printf("%d\n", g);
}
```

Solution:

b % a * c = 3%7*2=3*2=**6**

(float)(a/b)+c/d=(float)(7/3)+ 2/4.0=(float)(2)+ 2/4.0=2.0+0.5=**2.50**

(float)a/(b-1)*2+d=(float)7/(3-1)*2 + 4.0=7.0/2*2+4.0=7.0+4.0=**11.000000**

a && b = 7&&3 = **1**

```
!a || !b = !7 || !3 = 0 || 0 = 0

b=a=7+1=8

a*c = 8*2 = 16


g = --a * (2 + c) / 2 - c++ * b;
rewriting it as:
--a  (a=7)
7*(2+2)/2-2*8 = 7*4/2-16=28/2-16=14-16=-2
c++
```
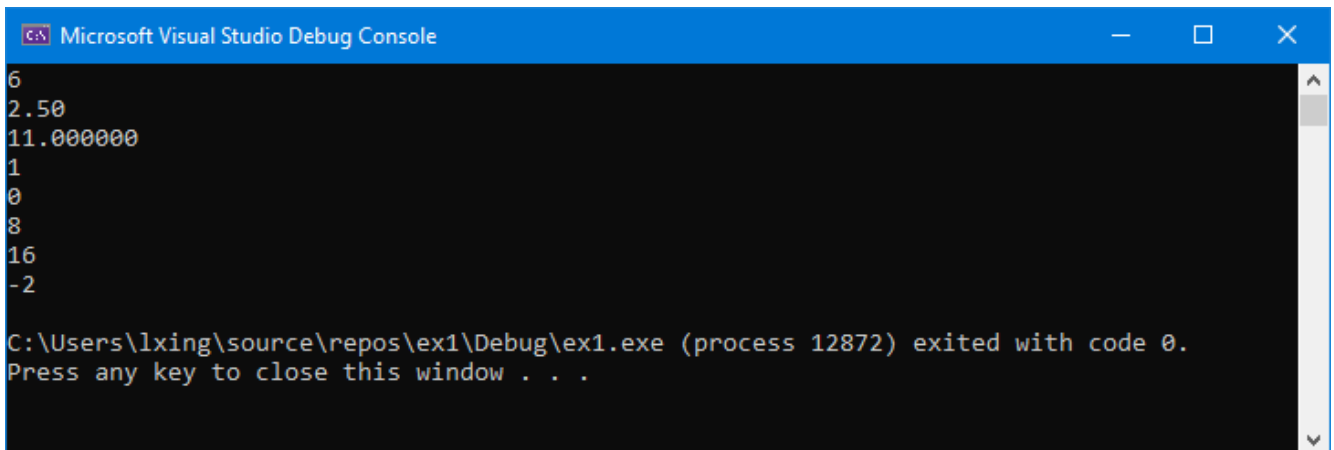
```
CA Microsoft Visual Studio Debug Console                        —    □    X
6
2.50
11.000000
1
0
8
16
-2

C:\Users\lxing\source\repos\ex1\Debug\ex1.exe (process 12872) exited with code 0.
Press any key to close this window . . .
```

2. Correct errors in the following C program. Then run the program by input 3 and 6. The output should be

The value of b is 6.000
The value of a/b is 0.500000

```
/* This is a debugging problem in Exam #1  /*
#include <stdio.h>;
void main(void);
{
    integer a=0
    float  b=0
    printf(Please input two numbers:\n);
    Scanf_s("%d%f", a, b);
    printf("The value of b is %5.3f\n", &b);
    printf("The value of a/b is %d %f\n", a/b).
}
```

Solution:
Explanation of all the errors:

1. /* This is a debugging problem in Exam #1 /* 1) /* should be */

```
2.  #include <stdio.h>;                                    2) ; should be removed
3.  void main(void);                                       3) ; should be removed
4.  {
5.      integer a=0                           4) integer should be int  5) ; is missing
6.      float  b=0                            6) ; is missing
7.      printf(Please input two numbers:\n);  7) "" is missing
8.      Scanf_s("%d%f", a, b);                8) S → s  9) & is missing: &a, &b
9.      printf("The value of b is %5.3f\n", &b);   10) remove &
10.     printf("The value of a/b is %d %f\n", a/b).   11) remove %d  12) period → ;
11. }
```

Program after correcting all the errors:

```c
/* This is a debugging problem in Exam #1 */
#include <stdio.h>
void main(void)
{
    int a = 0;
    float  b = 0;
    printf("Please input two numbers: \n");
    scanf_s("%d%f", &a, &b);
    printf("The value of b is % 5.3f\n", b);
    printf("The value of a/b is %f\n", a/b);
}
```

Test Run using 3 and 6:

3. Write a complete C program that can perform the following consecutive tasks:
    1) Read an integer number from the keyboard.
    2) Extract the last digit of the number. Note that you may use the modulo % operator to extract the last digit. For example, $19\%10 = 9$, $63\%10 = 3$.
    3) If the last digit of the number is less than 7, you multiply the number by 10; otherwise (i.e., the last digit is 7 or greater), you add 10 to the number.
    4) Print out the updated integer number.

    Example Runs to Test your Program:
    1) Input 19 from the keyboard, 29 should be displayed on the screen
    2) Input 63 from the keyboard, 630 should be displayed on the screen

<u>Solution (An Example):</u>

```c
#include <stdio.h>
void main(void)
{
    int num;
    int LD;
    num = 0;
    LD = 0;

    printf("Please input an integer number: \n");
    scanf_s("%d", &num);

    LD = num % 10;

    if (LD < 7)
        num = num*10;
    else
        num = num + 10;

    printf("The updated number is %d.", num);
}
```

Test Run using 19:

Test Run using 63:

4. Write a complete C program that can perform the following consecutive tasks:
   1) Read 2 integer numbers from the keyboard
   2) Add the two numbers
   3) If the sum of the two numbers is an even number, "The sum is an even number" is output. If the sum of the two numbers is an odd number, "The sum is an odd number" is output.
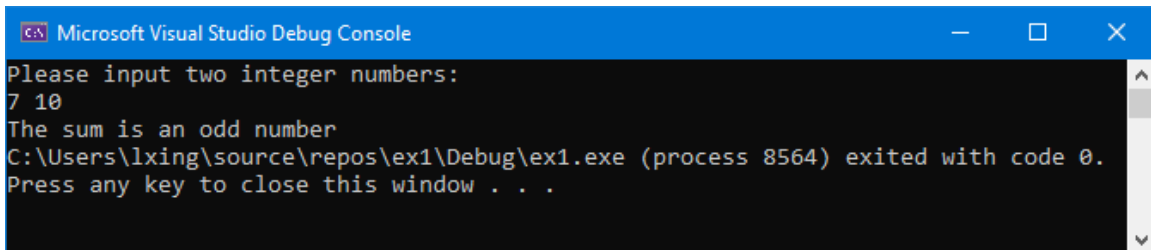
Example Runs to Test your Program:

1) Input 7 and 10 from the keyboard, "The sum is an odd number" is displayed
2) Input 23 and 19 from the keyboard, "The sum is an even number" is displayed

Solution (An Example):

```c
#include <stdio.h>
void main(void)
{
    int a;
    int b;
    a = 0;
    b = 0;
    int sum = 0;

    printf("Please input two integer numbers: \n");
    scanf_s("%d%d", &a, &b);
    sum = a + b;
    if ((sum % 2) == 0)
        printf("The sum is an even number");
    else
        printf("The sum is an odd number");
}
```
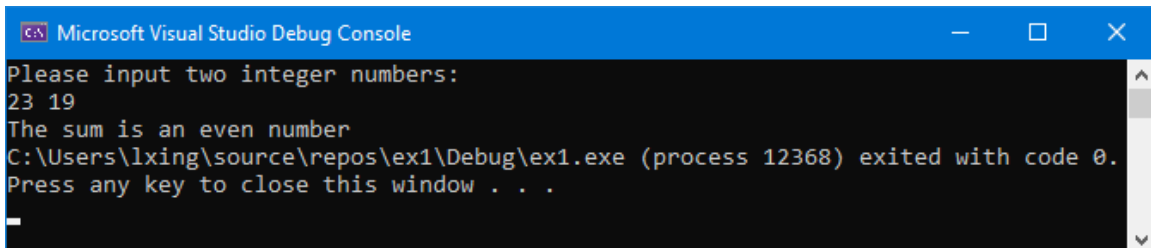
Test Run using 7 and 10:

Test Run using 23 and 19: