

Solution to Exercises in L#17

Solutions to Review Questions on Slide 4

- F The value of `floor(-3.7)` is ~~-3~~ -4
- F The value of `abs(7)` is ~~-7~~ 7
- F The value of expression `ceil(1.234*100+0.3)/100` is ~~1~~
double `ceil` (double number); → 1.24

Solution to Exercise (2) on Slide 15

What is the range of the following random numbers?

`rand() % 11` **0 ~ 10**

`rand%10 +10` **10 ~ 19**

`rand()%5-1` **-1 ~ 3**

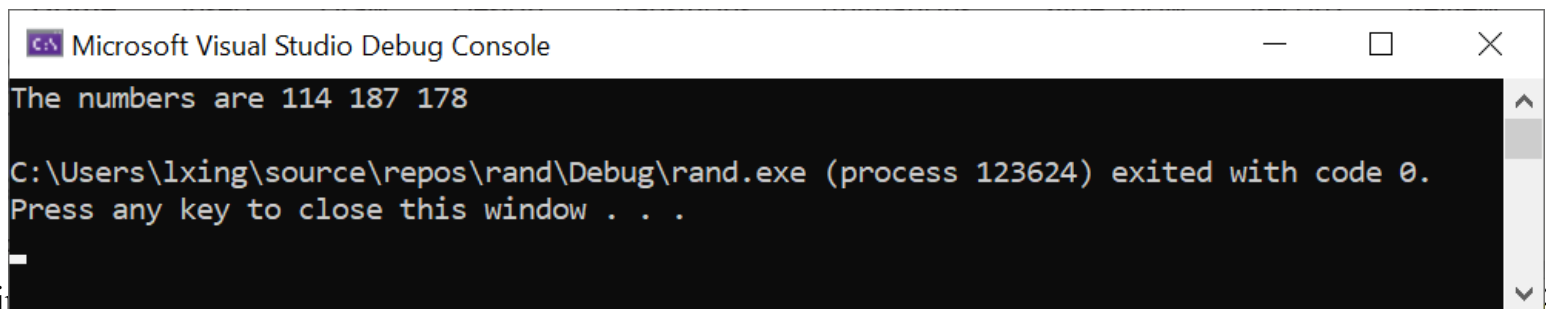
Solution to Modify Exercise (3) on Slide 16

```
#include "stdlib.h"
#include "stdio.h"
#include "time.h"

void main(void)
{
    int myrand1;
    int myrand2;
    int myrand3;

    srand(time(NULL));
    myrand1 = rand()%101+100;
    myrand2 = rand()%101+100;
    myrand3 = rand()%101+100;

    printf("The numbers are %d %d%d\n",myrand1,myrand2, myrand3);
}
```



The screenshot shows a window titled "Microsoft Visual Studio Debug Console". The output text is as follows:

```
The numbers are 114 187 178

C:\Users\lxing\source\repos\rand\Debug\rand.exe (process 123624) exited with code 0.
Press any key to close this window . . .
```

Results of Testing Exercises (4) on Slide 20

```
Microsoft Visual Studio Debug Console
Please enter a character
A
You entered a letter
You entered an uppercase letter

C:\Users\lxing\source\repos\rand\Debug\rand.exe (process 98440) exited with code 0.
Press any key to close this window . . .
```

```
Microsoft Visual Studio Debug Console
Please enter a character
9
You entered a digit

C:\Users\lxing\source\repos\rand\Debug\rand.exe (process 126096) exited with code 0.
Press any key to close this window . . .
```

```
Microsoft Visual Studio Debug Console
f
You entered a letter
You entered a lowercase letter
I converted the character to uppercase F

C:\Users\lxing\source\repos\rand\Debug\rand.exe (process 107824) exited with code 0.
Press any key to close this window . . .
```

Solutions to Review Questions on Slide 21

- F The character classifications are found in the standard library header file `stdlib.h` (`ctype.h`)
- F To check if a character is uppercase, the `toupper` function is used `isupper()`
- F The expression `rand()%20-6` can create a random number in the range `-6 ~ 14`
`-6 ~ 13`

Solution to Exercise on Slide 25

Implementation #1 (Iterative Solution)

```
#include "stdio.h"
long factorial(int n);
void main(void)
{
    int a;
    long f;
    printf("Enter a number \n");
    scanf_s("%d",&a);

    f =factorial(a);

    printf("The factorial is %d \n", f);

}
```

```
long factorial(int n)
{
    int i;
    long fact=1;

    for(i=1; i<= n; i++)
    {
        fact = fact * i;
    }

    return fact;
}
```

Solution to Exercise on Slide 30

Implementation #2 (Recursive)

```
#include "stdio.h"

long factorial(int n);

void main(void)
{
    int a;
    long f;
    printf("Enter a number \n");
    scanf_s("%d",&a);

    f =factorial(a);

    printf("The factorial is %d \n", f);

}
```

```
long factorial(int n)
{
    if (n == 0)
        return 1;
    else
        return(n*factorial(n-1));
}
```


Solution to Exercise (5a) on Slide 32 (Recursive)

- To start the series, we need to know the first two numbers: 0 and 1 → **base cases!**
- General case:

$$\text{Fibonacci}(n) = \text{Fibonacci}(n-1) + \text{Fibonacci}(n-2)$$

```
long fib(long n)
{
    if ((n == 0) || (n == 1))
        return n;
    return(fib(n-1)+fib(n-2));
}
```

Solution to Exercise (5b) on Slide 33 (Iterative)

```
long fib(long n)
{
    int i;
    long cn = 1;
    long pn = 0;
    long ppn;

    for (i=1; i<n; i++)
    {
        ppn = pn;
        pn = cn;
        cn = ppn + pn;
    }
    return cn;
}
```