CS215: Introduction to Program Design, Abstraction and Problem Solving
(Spring, 2025)
Lab Assignment 3
(20 points)
Today's Date: Monday, January 27
Demonstration Due Date: by the end of Lab4 class
Submission Due Date: Friday, February 7

The purpose of this lab assignment is

- to get familiar with Microsoft Visual Studio IDE.
- to continue practicing using input/output.
- to continue practicing using variables, fundamental data types and basic operations.
- to practice using conditional statements and nested conditional statements.

Problem Statement

Write a program that

- First, it asks the user to choose whether sorting order is in Ascending order ('A' or 'a') or Descending order ('D' or 'd'); if the user inputs other character, quit the program directly.
- Second, it reads three integer numbers and sorts these three numbers in the order according to the choice from first step.
- Last, it reports that three numbers are in **lenient** or **strict ascending/descending** order. Only when three numbers are all different, the ordering is **strict**, otherwise it is a **lenient** ordering. Note that when three numbers are all the same, it is lenient, but it can be lenient ascending or lenient descending depending on the choice from the first step.

(For this Lab assignment, you are not allowed to use any sorting algorithms or sort() function yet, for the purpose of practicing conditional statements!!!)

The following are some sample outputs of running your program, and the output of your program should **EXACTLY** match the sample output with the same testing case: (Note that the blue part represents the user input, and "↲" represents the enter/return key from the user input.

Sample output 1:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): S↲
Invalid choice, quitting the program...
```

Sample output 2:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↵
Please enter three integer numbers: 5 5 5↵
Numbers are sorted in ascending order:
5 <= 5 <= 5
Numbers are in leniently ascending order!
```

Sample output 3:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): a↵
Please enter three integer numbers: 5 5 7↵
Numbers are sorted in ascending order:
5 <= 5 <= 7
Numbers are in leniently ascending order!
```

Sample output 4:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↵
Please enter three integer numbers: 5 7 5↵
Numbers are sorted in ascending order:
5 <= 5 <= 7
Numbers are in leniently ascending order!
```

Sample output 5:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): a↵
Please enter three integer numbers: 7 5 2↵
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 6:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↵
Please enter three integer numbers: 2 5 7↵
```

```
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 7:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): a↵
Please enter three integer numbers: 2 7 5↵
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 8:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↵
Please enter three integer numbers: 7 2 5↵
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 9:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↵
Please enter three integer numbers: 5 2 7↵
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 10:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): a↵
Please enter three integer numbers: 5 7 2↵
Numbers are sorted in ascending order:
2 <= 5 <= 7
Numbers are in strictly ascending order!
```

Sample output 11:

```
Your wish is my command!
```

```
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): A↲
Please enter three integer numbers: 7 5 5↲
Numbers are sorted in ascending order:
5 <= 5 <= 7
Numbers are in leniently ascending order!
```

Sample output 12:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): d↲
Please enter three integer numbers: 7 7 7↲
Numbers are sorted in descending order:
7 >= 7 >= 7
Numbers are in leniently descending order!
```

Sample output 13:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): D↲
Please enter three integer numbers: 7 7 3↲
Numbers are sorted in descending order:
7 >= 7 >= 3
Numbers are in leniently descending order!
```

Sample output 14:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): d↲
Please enter three integer numbers: 7 5 3↲
Numbers are sorted in descending order:
7 >= 5 >= 3
Numbers are in strictly descending order!
```

Sample output 15:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): D↲
Please enter three integer numbers: 7 3 5↲
Numbers are sorted in descending order:
7 >= 5 >= 3
```

```
Numbers are in strictly descending order!
```

Sample output 16:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): d↵
Please enter three integer numbers: 5 3 7↵
Numbers are sorted in descending order:
7 >= 5 >= 3
Numbers are in strictly descending order!
```

Sample output 17:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): D↵
Please enter three integer numbers: 5 7 3↵
Numbers are sorted in descending order:
7 >= 5 >= 3
Numbers are in strictly descending order!
```

Sample output 18:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): d↵
Please enter three integer numbers: 3 7 5↵
Numbers are sorted in descending order:
7 >= 5 >= 3
Numbers are in strictly descending order!
```

Sample output 19:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): D↵
Please enter three integer numbers: 3 5 7↵
Numbers are sorted in descending order:
7 >= 5 >= 3
Numbers are in strictly descending order!
```

Sample output 20:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
```

```
D): D↲
Please enter three integer numbers: 7 3 7↲
Numbers are sorted in descending order:
7 >= 7 >= 3
Numbers are in leniently descending order!
```

Sample output 21:

```
Your wish is my command!
I will sort three numbers under your wish:
Enter A for ascending order, D for descending order (A or
D): d↲
Please enter three integer numbers: 3 7 7↲
Numbers are sorted in descending order:
7 >= 7 >= 3
Numbers are in leniently descending order!
```

Demonstration and Submission

1. Each Lab assignment needs to demonstrate to your TA to be graded. You can demonstrate Lab3 during Lab3 class (with possible bonus 3 points) or no later than the end of Lab4 class (this is the **demonstration deadline** for Lab3).
If you finish Lab3 assignment during Lab3 class, you may demonstrate your program to your TA and answer your TA's questions, you can get up to 3 extra points for this lab assignment. (Note you can also demonstrate your program to your TA during Lab4 class. However, any demonstration later than the end of the Lab3 class cannot get bonus 3 points.)
If you need extra time, you can continue working on Lab3 assignment after the Lab class and try to finish it before the next Lab class. Then demonstrate your Lab3 during Lab4 class.
If you do not demonstrate your code, even if you submit it in Canvas, you will receive a grade of 0!! *The TA may ask you to make some corrections. If so, make the corrections and demonstrate again…repeat until you have 100%!*

2. After the successful demonstration, submit the code in Canvas. Open the link to Course Canvas page (https://www.uky.edu/canvas) and log in to your account using your LinkBlue ID and password. Please submit your **source code in a .cpp file** through link "**`Lab 3`**".
Even if you successfully demonstrated it to the TA, if you do not submit in Canvas by the submission deadline, you will receive a grade of 0!

Grading (20 points + Bonus 3 points)

1. Attend the lab session or have a documented excused absence. (**5 points**)
2. Demonstrate your program to your TA and submit it in Canvas. (**15 points**)
   - Include comments as specified in the lecture notes. (1 point)
   - Lay out your program in a readable fashion with consistent indentation. (1 point)
   - Check whether the user chooses the valid choice (either A or D). (2 points)

- Generate the correct order for three input numbers. (2*4 = 8 points)
- Report the correct ordering: either lenient or restrict; ascending or descending (3 points)

Demonstrate your program to your TA and answer TA's questions during Lab class when the same Lab assignment is given. (**Bonus 3 points**)