

Project 5 Instructions [10 points]

1. **Due Date & Time:** November 11, 2022 at 11:59 pm (PT)
2. **What to submit:** Submit 1 zip file containing 4 files as described below by the deadline.
 - **2 JAVA Files:** Convert.java and TicTacToe.java
 - **1 Word/PDF File:** Make a document that shows the screen captures of execution of your programs and learning points in Word or PDF. Please make sure you capture at least 2 executions for each of the programs, so 6 screen captures and write one paragraph reflecting on what you learned from this exercise [1 points]

Please submit all required files together in a zip file, via iLearn Assignments Submission

Please make the zip file name according to the naming convention: proj5_<FIRST NAME>_<LAST NAME>.zip

Always read through the entire assignment before starting and submitting any of it.

Missing files or missing requirements will result in deducted points.

Program 1: Convert [3 points]

Write a function that takes in user input as a string. For all characters which are numeric, double its value and, if it is two digits, then replace it with the sum of its digits (e.g., 6 → 12 → 3 whereas 3 → 6). For all characters which are in uppercase, replace it with lowercase. For all characters which are in lowercase, replace it with uppercase (e.g., m → M and N → n). The program should keep asking the user to enter strings until they either enter 'q' or 'Q'.

For example,

- if the input is "3rD", then the output is "6Rd"
- If the input is "6sT", then the output is "3sT"
 - The first number (6) becomes 3 because 6 times 2 is 12 and the sum of its digits is 3 (1+2).

```
Please enter [q] or [Q] to terminate the program!
```

```
Original string (input)   : 3rD
```

```
Converted string (output): 6Rd
```

```
Original string (input)   : 6sT
```

```
Converted string (output): 3sT
```

```
Original string (input)   : Q
```

```
Terminating upon user's request!
```

Another, slightly more extended example:

```
Please enter [q] or [Q] to terminate the program!

Original string (input)  : 42MeaningOfLife!
Converted string (output): 84mEANINGoFLIFE!

Original string (input)  : ("\"(;..;)/")DisBea12!
Converted string (output): ("\"(;..;)/")dISbEA24!

Original string (input)  : q
Terminating upon user's request!
```

Notice that characters which are **not numbers or letters** are **not converted**.

Part 2: TicTacToe [6 points]

Use the attached `TicTacToe.java` (it is in the iLearn page) to write a program that will allow two users to play tic-tac-toe. The program should ask for moves alternately from player X and player O. The program displays the game positions as follows:

1	2	3
4	5	6
7	8	9

X's turn (enter position number): **2**

Once X enters (in this case 2), then the board displays X at that position and asks for next input (from O):

1	X	3
4	5	6
7	8	9

O's turn (enter position number): **3**

The player O enters 3, then it will show like below;

1	X	O
4	5	6
7	8	9

Your program should check if the user entered a valid position. A position can be invalid if:

- 1) User enters a number less than 1 or greater than 10 i.e., the position number does not exist
- 2) A user has already selected the position. For example in the above case, selecting 2 would be invalid after X's move because X selected 2 in the first round.

In both these cases, the program should ask the user to enter a valid position. For example, say you have this board:

1	X	O
4	5	6
7	8	9

X's turn (enter position number): 2

Invalid position. Enter a valid position.

X's turn (enter position number): 5

1	X	O
4	X	6
7	8	9

Program ends when there is no place to enter, or a winner is decided. A winner is someone who has 3 places in a row (horizontally, vertically, or diagonally). Your program should check if there is a winner after each user's input and announces a winner when it detects one.

O's turn (enter position number): 6

1	X	O
4	X	O
7	8	9

X's turn (enter position number): 8

1	X	O
4	X	6
7	X	9

***** X WINS !!! *****

Part 3: Reflection 500 words + screen capture of executions [1 point] **(a Word or PDF file)**

- Add screenshots of your program executions
- Share what was helpful and what was not helpful in working on the programs
- Suggestion: Additionally, try answering some of these questions:
 - What new thing did you learn from this project?
 - What did you wish you knew better before beginning this project?
 - Was there something that you had misunderstood before that now feels clearer?
 - Is there something that you wish your instructor and mentor could have taught you that could have helped you to do better on the project?