TCSS371 – Machine Organization
Assignment 4 – Machine Code & Assembly Language
20 Points

<mark>Group Members' Name(s)</mark>: _____

Purpose: This homework will test your understanding of machine code and assembly language programming from Chapters 5, 6, and 7 of the textbook.

Student Learning Outcomes: The following student-learning outcomes are addressed in this assignment:

- translate between assembly instructions and machine code
- write small programs in assembly language including function calls

Instructions
- I suggest that you write program steps in pseudocode or plain English before coding. You don't need to submit this, but it helps to do design before implementation and your descriptions of the steps can serve as comments in your code.
- Start your program at x3000.
- Each program must include a header comment that has your name(s) and a brief description of the program.
- Make sure to comment each line of code in the case of machine code and have adequate comments in case of assembly code. You will be graded on comments. Use the four-column model for assembly code as shown in class.

1. Write a **machine code program** for the LC3. It should print out the letters: ZYX..DCBAABCD....XYZ. That's a total of 26 * 2 = 52 letters. You must use one or two loops. Name your file PrintLetters.bin.

2. Write an **assembly language program** to simulate a simple guessing game. The program has stored the value 7. The program will continually ask the user to guess a number between 0 and 9 (see sample program input/output below.). If your program encounters any non-digit character, the program should output 'Invalid input'. Invalid input should still count as a guess. You can use "\n" in your strings (.STRINGZ) to make the prompt start on a newline. Name your file GuessingGame.asm. *Assume that the user gets it right within 9 guesses.*

Sample Output
Guess a number 0 to 9: 3
Too small.
Guess again: 9
Too big.
Guess again: a
Invalid input.
Guess again: 7
Correct! You took 4 guesses.

Submission guidelines: Submit your homework on Canvas before the due date with the filenames provided.

Grading Criteria: This assignment is worth 20 points and will be graded using the rubric below.

	Points
PrintLetters.bin	Machine code assembles and works correctly (4 Points) Program header is present and code commented adequately (1 Point) File named incorrectly (-0.5 Point)
GuessingGame.asm	Assembly code compiles (1 Point) Works correctly for all cases (10 Points) Output matches above sample (2 Points) Program header is present and code is commented adequately (2 Points) File named incorrectly (-0.5 Point)