CS 278
PA 10 - Counting

You are provided with two data files: scrabble3.txt and scrabble4.txt. These files contain lists of 3- and 4-letter words, respectively, that are acceptable in the game of Scrabble. The words in the files are all lowercase and they are already sorted.

Never played Scrabble? The rules of Scrabble can be found here https://scrabble.hasbro.com/en-us/rules.

The file with 3-letter words contains 1065 words. The file with 4-letter words contains 3996 words.

Write a complete Java program. You must code according to the Documentation and Style guidelines for the course. The program you submit must compile. Programs with syntax errors will receive a grade of 0.

Average expected time to completion: 6 hours.

Before you begin, it is recommend that you read the JavaBytes document for this lab. Also, it is recommend that you review how to use the Arrays.binarySearch method.

You must write a main method. You may write additional "helper" methods as needed.

Below are the essential steps. The details of how to implement these steps are up to you to determine.

Sample output is shown on page 3.

1) Open the 3-letter word file and input the strings into an array called **scrabbleWords3.** (See the Java Bytes for instructions on how to get input from a file.)

2) Open the 4-letter word file and input the strings into an array called **scrabbleWords4**.

3) Input 3 letters from the user. (Reminder: Java does not have a "nextChar" method.) The 3 letters represent the letters on Scrabble tiles. You may assume that the user types only letters. You do not have to check for this.

4) Calculate the number of permutations possible with 3 letters. Print this number. Use this number to allocate space for an array called **threeLetterPermutations**.

5) Construct all 3-letter permutations that can be made with the user's letters. Store these strings in the array **threeLetterPermutations.** Print the permutations.

6) Determine how many of these permutations are valid Scrabble words. Store the valid words in an array called **valid3LetterWords.**

   *Note: The size of the valid3LetterWords array is the same as the size of the array threeLetterPermutations. You will fill only part of this array. The remaining elements in the array will contain **null**.*

   Print the valid words. (If there are no valid 3-letter Scrabble words, print a message stating so.)

7) Calculate the number of permutations possible if we were to include one more tile in the first position. That tile can be any letter of the alphabet. The other 3 tiles are the user's letters. Print this number. Use this number to allocate space for an array called **fourLetterPermutations.**

8) For each of the 26 letters in the alphabet, in order, add the letter to the beginning of each element of threeLetterPermutations. Store the new strings in the array **fourLetterPermutations**.

9) Determine how many of these 4-letter strings are valid Scrabble words. Store these strings in an array called **valid4LetterWords**.

   *Note: The size of the valid4LetterWords array is the same as the size of the array fourLetterPermutations. You will fill only part of this array. The remaining elements in the array will contain **null**.*

   Print the valid Scrabble words. (If there are no valid 4-letter Scrabble words, print a message stating so.)

10) Print a summary with the number of 3-letter and 4-letter moves that are possible.

See the next page for sample program runs.

Submit PA10.java on Canvas.

Sample Program Run #1 (Green font indicates user input.)

```
Enter 3 letters with no spaces in between: jpq

There are 6 3-letter permutations.  They are:
jpq
jqp
pjq
pqj
qjp
qpj

There are no valid 3-letter Scrabble words.

If one letter is added at the beginning, there are 156 permutations.

There are no valid 4-letter Scrabble words.

Depending on the letters on the board, you have 0 3-letter moves and 0 4-letter moves.
```

Sample Program Run #2 (Green font indicates user input.)

```
Enter 3 letters with no spaces in between: ile

There are 6 3-letter permutations.  They are:
ile
iel
lie
lei
eil
eli

The permutations that are valid 3-letter Scrabble words are:
lie
lei

If one letter is added at the beginning, there are 156 permutations.

The permutations that are valid 4-letter Scrabble words are:
bile
ceil
diel
deil
deli
file
heil
mile
pile
plie
rile
riel
tile
vile
veil
wile

Depending on the letters on the board, you have 2 3-letter moves and 16 4-letter moves.
```