22C:16 Homework 7

Due via ICON on Wednesday, March 23rd, 4:59 pm

Submit the solutions to all 3 problems, but we will grade some 2 problems of our choice from your submission.

1. Write a program that reads a bunch of points in 2-dimensional Euclidean space and outputs the pair of points that are closest. Each point is specified in a separate line with the x-coordinate specified first followed by the y-coordinate. The two coordinates are separated by one or more whitespaces. After all the points have been provided the user will type an extra enter (i.e., an empty line) to indicate that she is done. In general, the coordinates will be floating point numbers. An example of the interaction between your program and the user is given below.

   ```
   Please input the points:
   3.5  -4
   2 2
   12.0 9.86
   12 9.0

   The closest point pair is point 3 = (12.0, 9.86) and point 4 = (12.0, 9.0)
   ```

2. Write a function called `multiplicationTable` that takes a positive integer `n` and returns the `n` × `n` multiplication table as a nested list. For example, if `n` were 3, then the function should return the list:

   ```
   [[1, 2, 3], [2, 4, 6], [3, 6, 9]]
   ```

   The first element of this list is the first three items in the one-times table, the second element is the first three items in the two-times table, and the third element is the first three items in the three-times table.

3. To solve this problem, look up Caeser Cipher on Wikipedia.

   (a) Write a function called `CaeserCipher` that takes as parameter a string `s` and an integer `k` and replaces every letter (upper case or lower case) in `s` by the letter obtained by shifting the original letter by the amount `k`. The function should return the encrypted text.
   Notes: (i) The parameter `k` may be positive, 0, or negative. (ii) Characters in `s` that are not letters should remain as they are. (iii) Lower case letters should be replaced by other lower case letters and upper case letters should be replaced by other upper case letters.

   (b) Write a program that reads some text and produces as output the corresponding encrypted text. As in earlier problems, the end of the text is specified by an extra `enter` character. Here is an example of how a user might interact with this program. The first line `Enter your text:` is the prompt produced by the program. Following this prompt, I entered some text (the first line of President Lincoln's Gettysburg speech) and then typed an extra `enter`. Notice how the output produced by the program does not disturb the punctuation or the whitespaces. In this example, I used 4 as the Caeser Cipher key. This choice was quite arbitrary.

```
Enter your text:
Now we are engaged in a great civil war,
testing whether that nation, or any nation, so conceived and so dedicated,
can long endure.
                                    -- Abraham Lincoln, Nov 19, 1863

Rsa ai evi irkekih mr e kviex gmzmp aev,
xiwxmrk alixliv xlex rexmsr, sv erc rexmsr, ws gsrgimzih erh ws hihmgexih,
ger psrk irhyvi.
                                    -- Efveleq Pmrgspr, Rsz 19, 1863
```

_____