Goals

- To enjoy a simple programming assignment done in a variety of functional programming languages.
- To reflect on this experience through a consulting log.
- To facilitate discussions about programming and languages.

Instructions

Develop a set of functions that will allow you to encrypt a string using a Caesar cipher.
Develop a set of functions that will allow you to decrypt a string using a Caesar cipher.
Develop a set of functions that will help you to solve (break) a Caesar cipher.

Implement all of the above functions for all of the following languages:

- Encrypt, Decrypt, Solve in LISP [15 points]
- Encrypt, Decrypt, Solve in ML [15 points]
- Encrypt, Decrypt, Solve in Erlang [15 points]
- Encrypt, Decrypt, Solve in Haskell ¹ [15 points]
- Encrypt, Decrypt, Solve in Scala (in a functional manner) [15 points]

¹ If you like, you may, with my approval, substitute another functional programming language for Haskell. Just ask me first. I recommend Prolog.

Log and Commentary [75 points]

Make a prediction about how long you think it will take you to program this assignment. Write it down. Then keep a log of your work, just like you would as a consultant. The format should be similar to the following:

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours Spent</th>
<th>Tasks / Accomplishments / Issues / Thoughts</th>
</tr>
</thead>
</table>

Be thorough and descriptive in your log. Sum the hours spent when you are finished. Note your original prediction on the log. Write a paragraph or two to explain the discrepancy. (It will likely be huge.)

Finally, and most importantly, keep a running commentary (“Dear Diary...”) about your thoughts and experience with each language, including how each language is similar or dissimilar to the others. Tell me in great detail about your thoughts on each language regarding its readability and writability, and what you loved and hated about each. Include a list of your Google searches, as I find that fascinating. When you’re done, rank the languages.

This is, by far, my favorite part of this assignment. I look forward to reading your thoughts, searches, and comments, so be thoughtful, thorough, amusing, and impress me.

Submitting

Make a PDF of your consulting log, commentary, source code, and output of (extremely) thorough test runs. Be sure that it’s all one PDF document. E-mail it to me any time before the class in which it is due. Remember to include your name in the write-up and in your comments.

Examples on the next page
The usage for **encrypt** and **decrypt** should be as follows:

```plaintext
encrypt(str, shiftAmount)
decrypt(str, shiftAmount)
```

**ML example:**

```plaintext
- val x = encrypt("This is a test string from Alan", 8); 
val x = "BPQA QA I BMAB ABZQVO NZWU ITIV" : string

- decrypt(x, 8); 
val it = "THIS IS A TEST STRING FROM ALAN" : string
```

Things might be easier if you use only capital letters, so consider writing a “toUpperCase” function so that you can deal with mixed-case input. It’s okay if your output is all caps.

The usage for **solve** should be as follows:

```plaintext
solve(str, maxShiftValue);
```

**ML example:**

```plaintext
- solve("HAL", 26);

  Caesar 26: HAL
  Caesar 25: GZK
  Caesar 24: FYJ
  Caesar 23: EXI
  Caesar 22: DWH
  Caesar 21: CVG
  Caesar 20: BUF
  Caesar 19: ATE
  Caesar 18: ZSD
  Caesar 17: YRC
  Caesar 16: XQB
  Caesar 15: WFA
  Caesar 14: VOE
  Caesar 13: UNY
  Caesar 12: TMX
  Caesar 11: SLW
  Caesar 10: RKV
  Caesar 9: QJU
  Caesar 8: PIT
  Caesar 7: OHS
  Caesar 6: NGR
  Caesar 5: MFQ
  Caesar 4: LEP
  Caesar 3: KDO
  Caesar 2: JCN
  Caesar 1: IBM
  Caesar 0: HAL

val it = "": string
```