My First APL Program

DR. ANTHONY G. FRANCIS, JR.
The Library of Dresan

(1) *Assign the alphabet to variable Y.*

```
Y„'ABCDEFGHIJKLMNOPQRSTUVWXYZ'
```

Collate the alphabet into a rotated matrix.

```
⍉(¯1 2 ¼ ½Y)∘.⊖2⊃Y
```

(7) ⊃ **disclose**
"Unboxes" the result from a list of boxes into a single square matrix.

(2) ⊂ **enclose**
"Boxes" the array Y so we can treat it as a single object.

(6b) ¯1 **negative one**
Rotate amount list to make the first element 26

(6a) 2 **rotate**
Shifts the array to the right by the amount to the left

(3a) 2 **rotate**
Shifts the array to the right by the amount to the left

(3b) ∘.⊖ **outer product**
Maps the rotate function over a list of rotate amounts.

(5) ¼ **index list**
Makes a list from 1 to its right argument.

(4) ½ **shape of**
Finds the size of the object to the right ... in this case, 26.

Output: a Vigenere Tableau

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
BCDEFGHIJKLMNOPQRSTUVWXYZA
CDEFGHIJKLMNOPQRSTUVWXYZAB
DEFGHIJKLMNOPQRSTUVWXYZABC
EFGHIJKLMNOPQRSTUVWXYZABCD
FGHIJKLMNOPQRSTUVWXYZABCDE
GHIJKLMNOPQRSTUVWXYZABCDEF
HIJKLMNOPQRSTUVWXYZABCDEFG
IJKLMNOPQRSTUVWXYZABCDEFGH
JKLMNOPQRSTUVWXYZABCDEFGHI
KLMNOPQRSTUVWXYZABCDEFGHIJ
LMNOPQRSTUVWXYZABCDEFGHIJK
MNOPQRSTUVWXYZABCDEFGHIJKL
NOPQRSTUVWXYZABCDEFGHIJKLM
OPQRSTUVWXYZABCDEFGHIJKLMN
PQRSTUVWXYZABCDEFGHIJKLMNO
QRSTUVWXYZABCDEFGHIJKLMNOP
RSTUVWXYZABCDEFGHIJKLMNOPQ
STUVWXYZABCDEFGHIJKLMNOPQR
TUVWXYZABCDEFGHIJKLMNOPQRS
UVWXYZABCDEFGHIJKLMNOPQRST
VWXYZABCDEFGHIJKLMNOPQRSTU
WXYZABCDEFGHIJKLMNOPQRSTUV
XYZABCDEFGHIJKLMNOPQRSTUVW
YZABCDEFGHIJKLMNOPQRSTUVWX
ZABCDEFGHIJKLMNOPQRSTUVWXY
```

The Vigenere Tableau is a part of Blaise de Vigenere's *polyalphabetic substitution cipher* and consists of a table of 26 copies of the alphabet, each row shifted one column to the left. This program takes an alphabet string as input and produces the Vigenere Tableau as a matrix of characters .

The program is executed from right to left:

(1) Assign the alphabet to the variable y
(2) Enclose Y in a "box" so we can map it
(3) Construct a function that rotates a box by a list of integers to produce a list of rotated arrays
(4) Find out the length of the alphabet
(5) List the integers from 1 to the length
(6) Shift that list 1 to the left and apply it to the rotate function we produced in step 3
(7) "Unbox" the list, transforming it from a list of boxes into a matrix of characters.