

21. (*expires 5/1*) Write a procedure in Maple that counts the frequency of letters in a string of text. For example, here is what it looks like when I use mine:

```
freqs("time flies like an arrow, fruit flies like a banana.");

[[ " ",9], ["i",6], ["a",6], ["e",5], ["n",4], ["l",4],
 ["r",3], ["f",3], ["t",2], ["s",2], ["k",2], ["w",1],
 ["u",1], ["o",1], ["m",1], ["b",1], [",",1], [".",1]]
```

In the above phrase, there are 9 spaces, 6 each of the letters “i” and “a”, “e” appears 5 times, and so on. [Hint: I found it useful to group identical letters in the text using `Implode(sort(Explode(text))`), but you might not.]

22. (*expires 5/1*) The text below was encrypted with a substitution cipher. Only the letters (both upper-case and lower-case) were substituted, leaving punctuation and spaces alone. Figure out what the original message was.

“wA’r aBeD WUeK AP XNaB NM U rALKNP USUeAJBMA NM zUM  
nPrB ZNAW U JUM ZWP’r XBUEMNMO AP SXUD AWB aNPXNM.”  
yWUA’r ZWUA rWB APXK AWB SPXNCB ZWBM rWB WUMKKB AWBJ  
AWB BJSAD eBaPXaBe.  
INCWUeK heULANOUM, “yWB zCUeXUAAN yNXA”

If you wish, you can find the encrypted text in the file [subscript.txt](#) from the problems area on the class web page.

23. (*expires 5/1*) The cryptography chapter in the notes is called “fsqFsHn sGGousG”, which is actually the result of applying a Caesar cipher to its original title. A 53-character alphabet consisting of all the upper-case letters, a space, and all the lower-case letters was used; consequently the space in the middle might or might not correspond to a space in the title. Determine what the original title was.