Sheet 1

Here is the table of frequencies.

E	T	R	I	N	O	A	S	D
12.6%	9.0%	8.3%	7.6%	7.6%	7.4%	7.2%	5.8%	4.0%
L	C	H	F	U	P	M	Y	G
3.6%	3.3%	3.3%	3.0%	3.0%	2.7%	2.5%	2.1%	1.8%
W	V	B	X	K	Q	J	Z	
1.4%	1.3%	1.1%	0.5%	0.3%	0.3%	0.2%	0.1%	

1. The following message is probably a Caesar cipher of some kind. Can you work out what it says?
   PDAOA HAYPQNAO WNA NAWHHU EJPANAOPEJC
   Hint: once you know what letter corresponds to 'E', you can work out the whole of the Caesar cipher.
2. Show that this code probably is not a Caesar cipher.
   QAHN YJPT HN MCQATM FJMT YJFKEHYCQTP.
3. Here is another message in the same code as the one in question 2. Does this help you to decode the message?
   TUTI NJ NSYA YJPTN YCI RT RMJDTI VHQA TOOJMQ
   Hint: First work out the frequencies of the various letters (in both messages combined) and write these below

Letter:	A	B	C	D	E	F	G	H	I	J	K	L	M
Frequency:													
Letter:	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency:													

   This should make it fairly clear what corresponds to 'E'.
   Now look at the first word of the second message, and see if you can guess what word that might be.
   Also, we have YJPT and YJPTN. This might imply that 'N' encodes 'S', since words often appear with and without an S on the end. We also have the word NJ, so we should be able to work out what 'J' is.

Copies of the messages, so you can fill in your ideas:
QAHN YJPT HN MCQATM FJMT YJFKEHYCQTP.

TUTI NJ NSYA YJPTN YCI RT RMJDTI VHQA TOOJMQ

ITUTM GHUT SK

4. As you are staring at the code from problem 3, another message is brought in. It reads
   ITUTM GHUT SK
continued on other side

Fill in the letters you already know, and see what that gives.
Now what does this tell you about the first two messages?
In particular, look at the last word of the second message, which has a double letter in it. Work out what this is.
You should by now have worked out what the code for 'T' is: since 'H' is the commonest letter after 'T', this will give 'H'.
Now what do the first two messages look like?
What else can you work out?

5. What about decoding the English text below? Here's the frequency analysis.

a	b	c	d	e	f	g	h	i	j	k	l	m
16	10	63	22	24	72	13	3	62	63	77	71	23
n	o	p	q	r	s	t	u	v	w	x	y	z
33	1	49	23	5	126	33	9	11	6	1	19	0

Sheet 1: question 5 coded message

Lns qks fd kpbgts mpgnsik, kqmn jk Mjskji mpgnsik, isjtty mjccfl asismfbbscese: lnsy jis oqkl lff sjky lf aisjr. Bfis vscsijtkqaklplqlpfc mpgnsik, Wnsis sjmn tsllsi pk isgisksclse ay jcflnsi fcs, aql, dfi sxjbgts, lns kqaklplqlpfck dfi 'j' jce 'a' jis cflcsmskkjipty istjlse, mjc as upjats dfi knfil bskkjvsk. Wnsc yfq njus jtfcv bskkjvs, susc lns qks fd lnpk kfil fd mfes pk cfl lf asismfbbscese, asmjqks dishqscmy jcjtykpk fd kljcejie Scvtpkn pk lffsjky.

Lnsis jis ujipfqk kftqlpfck lf lnpk gifatsb. Fcs pk lf isgtjms gjpikfd tsllsik ay gjpik fd csw fcsk, kf lnjl, pcklsje fd efpcv dishqscmy jcjtykpk fc pcepupeqjt tsllsik, fcs wfqte njus lf ef jcjtykpk fc gjpikfd tsllsik. Cfl fcty jis lnsis 676 gjpik, pcklsje fd 26 tsllsik, aqljtkf lnsis pk cf mtsji 'difcl iqccsi' jk 'S' pk j difcl iqccsi dfikpcvts tsllsi dishqscmy jcjtykpk.

Jcflnsi jtlsicjlpus pk lf mnjcvs lns scmfepcv susiy kf fdlsc. Gifupeselnjl lns mfes aisjrsi efsk cfl rcfw nfw fdlsc yfq jis mnjcvpcv pl, lnpk pk dpcs. Pd lns mfes aisjrsi efskrcfw, lnsc lnpk pk skksclpjtty qkstskk.