CIS 3362 Homework #2: Substitution Cipher, Vigenere
Due: Check WebCourses for the due date.

Part A: Code Break Questions

1) Decode the following message, which was encrypted using the substitution cipher. Make sure to discuss all the steps you took, the key you arrived at, and the decoded message.

```
ymlwrpnndvyxijlriewyficlwqvyjvlrislwtpmxsvlihiwyjcywjqqlzwip
tqvirijjpuiopmuiqyqysynnxlqvijpriqvymuqvyjdipwamclwqampqindq
vyjyjmqqvirijjpuiqvpqqinnjdlasviwiqviewyfiyjwpqviwqviblzlcqv
yjrijjpuiyjqlxijowyziqvpqqviwiyjlmibajqnytiqvizipnioyeviwzaq
amnytizipniqvyjewyfisynnpoqapnndigyjq
```

2) Decode the following ciphertext that was encoded using the Vigenere cipher with a keyword from this wordlist:

https://www.ef.com/wwen/english-resources/english-vocabulary/top-1000-words/

To help you automate your task, I will guarantee that the substring "last" will appear somewhere in the plaintext.

Here is the ciphertext:

```
sxvgjcvpsamltorbqmwaskvytneeyawceflrirtdrwmtoheiutlqxuzbzarbi
bilphbiblgrflrfayhvoacwxqkvoiyksmmvabzilmodszzkfacmrllotrfomr
ruqvrbsssjrmnwyxhbbtelvnbzaruaveldxvgtywqqwbfeelviorbqflnmszq
ropzbtuwngoeijcqtvgqpylyzyjcmisgakbmorignwdspmwuloelrgijhzqwf
tgpuhzakwbzxukepavgtyoiqxuxcwyrowwwapeaxngiyjxvkuugupiwptddvm
bghvkenxvjvjhbopnbmjshmzvkndhthoophxs
```

3) Decode the following message, which was encrypted using the Vigenere cipher. Make sure to discuss all the steps you took, the key you arrived at, and the decoded message.

```
jiaikmiwriuopleicwmrdeuiypieepcefhsdewbcssfzrtlraahfjsnyunyel
enusbxvdnwkplikgkccxpmdwreetsffbeosplaemhyzzilddmszqhbvzolous
uecsxkafaxzahzavqzxllohpyfskbvdelycstfazuzytzoniwrprnymtkbael
cwofcfhaciisjyuyeqevcpssrwpokfoekgiikcomzqrxyncolrcwimccswqnf
ufudnlaxcwokfonpauzkrimfpswymrsmpirjrcojqfgbaecyzwhrzdqyqvvrp
wiletwcpwajgklzfeeyniikgggfdedsgilprvuketsdewtzaofcktzoegaeba
ctfekdoaicjvycbygenicftslktecoumbvrhbvweqgeplemhmldpjsoisfksi
wkom
```

Part B: Written Questions Similar to Quiz/Exam Questions

4) Find 45^{-1} mod 157

5) For an alphabet of size 93, a set of affine encryption keys is a = 20, b = 87. (Thus the encryption function is f(x) = (20x + 87) % 93.) Determine the corresponding set of decryption keys.

6) Let x be a positive integer. A set of letters consists of 10 As, 30 Bs, 50 Cs, 70 Ds, and 90 Es. What is the index of coincidence of the set? **Leave your answer as a fraction in lowest terms.**

7) The set of letters S consists of 5 As, 40 Bs, 35 Cs, 10 Ds, and 10 Es. The set of letters T consists of 15 As, 10 Bs, 35 Cs, 30 Ds and 15 Es. What is the mutual index of coincidence between sets S and T? **Leave your answer as a fraction in lowest terms.**