**Long Cipher Letter Analysis:** GFS WMY OG LGDVS MF SFNKYHOSU ESLLMRS, PC WS BFGW POL DMFRQMRS, PL OG CPFU M UPCCSKSFO HDMPFOSXO GC OIS LMES DMFRQMRS DGFR SFGQRI OG CPDD GFS LISSO GK LG, MFU OISF WS NGQFO OIS GNNQKKSFNSL GC SMNI DSOOSK. WS NMDD OIS EGLO CKSJQSFODY GNNQKKPFR DSOOSK OIS 'CPKLO', OIS FSXO EGLO GNNQKKPFR DSOOSK OIS 'LSNGFU' OIS CGDDGWPFR EGLO GNNQKKPFR DSOOSK OIS 'OIPKU', MFU LG GF, QFOPD WS MNNGQFO CGK MDD OIS UPCCSKSFO DSOOSKL PF OIS HDMPFOSXO LMEHDS. OISF WS DGGB MO OIS NPHISK OSXO WS WMFO OG LGDVS MFU WS MDLG NDMLLPCY POL LYEAGDL. WS CPFU OIS EGLO GNNQKKPFR LYEAGD MFU NIMFRS PO OG OIS CGKE GC OIS 'CPKLO' DSOOSK GC OIS HDMPFOSXO LMEHDS, OIS FSXO EGLO NGEEGF LYEAGD PL NIMFRSU OG OIS CGKE GC OIS 'LSNGFU' DSOOSK, MFU OIS CGDDGWPFR EGLO NGEEGF LYEAGD PL NIMFRSU OG OIS CGKE GC OIS 'OIPKU' DSOOSK, MFU LG GF, QFOPD WS MNNGQFO CGK MDD LYEAGDL GC OIS NKYHOGRKME WS WMFO OG LGDVS.

This ciphertext was pulled from: <https://crypto.interactive-maths.com/frequency-analysis-breaking-the-code.html?fbclid=IwAR3weUx3KFrJqbqTvnoG0qR1ESodwEibWBNu6K7T0hK5l_X6o7xSKp5aU7A>

**Short Cipher Letter Analysis:** W RIZC YAE

**Message 1:** Hello World this is Tai Dao. The reason I am here is to see if I can crack my own message. I hope this is crackable. I don't know the minimum number of characters needed to do letter frequency analysis.

**Message 1 Encrypted w/ key(5, 8):** rclla oaplx zrwu wu ziw xia zrc pciuav w iq rcpc wu za ucc wh w siv spisg qy aov qcuuimc w rafc zrwu wu spisginlc w xav z gvao zrc qwvwqeq veqncp ah sripiszcpu vccxcx za xa lczzcp hpckecvsy ivilyuwu

1. Initially, it was really difficult to crack the long cipher using Frequency Analysis. This was because I removed all whitespaces from the original message. However, when I decided to change my code so that whitespaces are also preserved in the ciphertext it was easier to read and crack. I could try to pick out common English words such as,” a”, “I”, “the”, “to”, “of”, and “and”. The whitespaces help a lot!

It was also difficult at first because I had a hard time keeping track of my substitutions. Then I had an Idea where I will only make uppercase substitutions to my ciphertext which starts out as lowercase. This way it was easier to identify what has already been substituted. You can see this in the screenshots I included in this assignment. Anyways please see my **screenshots** so you know what I’m talking about

As for strategy, the first two things I usually do is replace the two most common occurrences with E and T respectively. Then I try to find letters that would form the world “THE” and replace that letter between the T and E with H.

And since T and O are common letters in English. I try to swap them until I see a couple ‘to’s…

2. I tried to crack cipher text that only has 10 characters, but it’s almost impossible. There are too few letters for letter frequency analysis to be effective. It’s hard to find a pattern when the ciphertext is only 10 characters. The sample is just not big enough to find common English words like “the”, “to”, “of”, “and”.

3. The minimum number of characters for me was roughly about 200. This is assuming there will be whitespaces in the ciphertext. If there are no whitespaces it would be significantly harder for me.