

## **Write up for part 1:**

the first step taken was using the line 'xxd --p ciphertext1 modciph1' to save all the bytes into a file called modciph1.

I then wrote a program called as1p1.py which would take that file and save those bytes (in 2s, ie. '5F') and store that into a list.

To find the length of the key i created 2 of the previously mentioned arrays and compared them to each other and shifted one of them over by on index each time to see which ones got the most hits. I saw that there were a lot of matches at 8, 16, 24 and more multiples if 8. so i figured the key was 8.

i then saved all the values that were being encrypted with the first key (ie indexes 1,9,17) and tried all possible printable ASCIIs on it and saved the ones that didn't have any non printable ASCIIs (plain text must all be printable) i repeated these steps for keys 2-8

at the end i had the key 5F 4C 69 74 46 75 54 5F

these were just the ones that produced the longest list of printable ASCIIs, so before doing any English frequency analysis i thought i would try it out to see what would happen.

It gave me:

The legend lives on from the Chippewa on down  
Of the big lake they called 'gitche gumee'  
The lake, it is said, never gives up her dead  
When the skies of November turn gloomy  
With a load of iron ore twenty-six thousand tons more  
Than the Edmund Fitzgerald weighed empty  
That good ship and crew was a bone to be chewed  
When the gales of November came early  
The ship was the pride of the American side  
Coming back from some mill in Wisconsin  
As the big freighters go, it was bigger than most  
With a crew and good captain well seasoned  
Concluding some terms with a couple of steel firms  
When they left fully loaded for Cleveland  
And later that night when the ship's bell rang  
Could it be the north wind they'd been feelin'?  
The wind in the wires made a tattle-tale sound  
And a wave broke over the railing  
And every man knew, as the captain did too,  
T'was the witch of November come stealin'  
The dawn came late and the breakfast had to wait  
When the gales of November came slashin'  
When afternoon came it was freezin' rain

In the face of a hurricane west wind  
When supertime came, the old cook came on deck sayin'  
Fellas, it's too rough to feed ya  
At seven pm a main hatchway caved in, he said  
Fellas, it's been good t'know ya  
The captain wired in he had water comin' in  
And the good ship and crew was in peril  
And later that night when his lights went outta sight  
Came the wreck of the Edmund Fitzgerald  
Does any one know where the love of God goes  
When the waves turn the minutes to hours?  
The searches all say they'd have made Whitefish Bay  
If they'd put fifteen more miles behind her  
They might have split up or they might have capsized  
They may have broke deep and took water  
And all that remains is the faces and the names  
Of the wives and the sons and the daughters  
Lake Huron rolls, superior sings  
In the rooms of her ice-water mansion  
Old Michigan steams like a young man's dreams  
The islands and bays are for sportsmen  
And farther below Lake Ontario  
Takes in what Lake Erie can send her  
And the iron boats go as the mariners all know  
With the gales of November remembered  
In a musty old hall in Detroit they prayed,  
In the maritime sailors' cathedral  
The church bell chimed till it rang twenty-nine times  
For each man on the Edmund Fitzgerald  
The legend lives on from the Chippewa on down  
Of the big lake they call 'gitche gumee'  
Superior, they said, never gives up her dead  
When the gales of November come early

which i looked up and it is a song by Gordon Lightfoot called ' the wreck of Edmund Fitzgerald'

because i got lucky with the first key i didn't need to do any English frequency analysis which saved a bit of time.

All code was written by our group except for line 121 which i got from stackoverflow which just sorts a dict by the smallest to largest values. (<https://stackoverflow.com/questions/613183/how-do-i-sort-a-dictionary-by-value>)