Problem 1

a) Output:

```
Hash: ef0ebbb77298e1fbd81f756a4efc35b977c93dae
Password: orange
Took 124 attempts to crack input hash. Time Taken: 0.0009148120880126953
```

b) Output:

```
Hash: 0bc2f4f2e1f8944866c2e952a5b59acabd1cebf2
Password: starfish
Took 2681 attempts to crack input hash. Time Taken: 0.002791881561279297
```

c) Output:

```
Hash: 9d6b628c1f81b4795c0266c0f12123c1e09a7ad3
Password: redbullpuppy
Took 2854 attempts to crack input hash. Time Taken: 0.0030968189239501953
```

d)
Failed to crack input hash .

Problem 2

d) Write a Python 3 program to compare the speed of the hash algorithms.
   Output:


```
sha1: 0.24125 seconds
sha512: 0.26101 seconds
md5: 0.32189 seconds
sha3_224: 0.37442 seconds
sha3_256: 0.39656 seconds
sha224: 0.44855 seconds
sha256: 0.44876 seconds
sha3_512: 0.74757 seconds
```

e) Which one is the fastest?
   SHA-1 is the fastest.

f) Rank the speed of each hash function.
   (fastest) SHA1 > SHA2-512 > MD5 > SHA3-256 > SHA3-224 > SHA-224 > SHA-256
   > SHA3-512 (slowest)

Problem 3

Given the transposition cipher:

UONCS VAIHG EPAAH IGIRL BIECS TECSW PNITE TIENO IEEFD OWECX TRSRX STTAR TLODY FSOVN EOECO HENIO DAARQ NAELA FSGNO PTE

Please decrypt this ciphertext.

Step:

a) Decompose 98 into $1 \times 98,\ 2 \times 49,\ 7 \times 14,\ 14 \times 7,\ 49 \times 2,\ 98 \times 1$.

b) Calculated the rectangle be of 14×7.

   1) For 1*98 rectangle, the average of the difference is 0.2
   2) For 2*49 rectangle, the average of the difference is 1.5
   3) For 7*14 rectangle, the average of the difference is 0.66
   4) For 14*7 rectangle, the average of the difference is 0.56
   5) For 49*2 rectangle, the average of the difference is 0.55
   6) For 98*1 rectangle, the average of the difference is 0.48

c) The optimal order obtained manually is [5, 2, 6, 7, 1, 4, 3].

Cypher Text							Plain Text						
1	2	3	4	5	6	7	5	2	6	7	1	4	3
U	H	S	E	T	E	Q	T	H	E	Q	U	E	S
O	I	W	F	T	O	N	T	I	O	N	O	F	W
N	G	P	D	A	E	A	A	G	E	A	N	D	P
C	I	N	O	R	C	E	R	I	C	E	C	O	N
S	R	I	W	T	O	L	T	R	O	L	S	W	I
V	L	T	E	L	H	A	L	L	H	A	V	E	T
A	B	E	C	O	E	F	O	B	E	F	A	C	E
I	I	T	X	D	N	S	D	I	N	S	I	X	T
H	E	I	T	Y	I	G	Y	E	I	G	H	T	I
G	C	E	R	F	O	N	F	C	O	N	G	R	E
E	S	N	S	S	D	O	S	S	D	O	E	S	N
P	T	O	R	O	A	P	O	T	A	P	P	R	O
A	E	I	X	V	A	T	V	E	A	T	A	X	I
A	C	E	S	N	R	E	N	C	R	E	A	S	E

d) Obtain the plaintext: **THE QUESTION OF WAGE AND PRICE CONTROLS WILL HAVE TO BE FACED IN SIXTY EIGHT IF CONGRESS DOES NOT APPROVE A TAX INCREASE**.