

# IDATT2503 - Cryptography - Crypto Assignment 1

## Problem 01

b) Calculate  $-99 \bmod 1001 = 902$

c) Calculate  $232 + 22 \cdot 77 - 183 \bmod 8 = 7$

d) Determine if  $55 \equiv 77 \pmod{12} = \text{False}$

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# Problem 1b: Calculate -99 mod 1001
mod_b = (-99) % 1001

# Problem 1c: Calculate 232 + 22 * 77 - 183 mod 8
mod_c = (232 + 22 * 77 - 183) % 8

# Problem 1d: Determine if 55 ≡ 77 (mod 12)
mod_d = (55 % 12 == 77 % 12)

mod_b, mod_c, mod_d
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## Problem 02

A number  $a \in \mathbb{Z}_n$ , i.e. an integer modulo  $n$ , has a multiplicative inverse if there exists  $b \in \mathbb{Z}_n$  such that  $ab \equiv 1 \pmod{n}$ .

a) Write the multiplication table of the elements of  $\mathbb{Z}_{12}$ , excluding the 0 element.

Multiplication Table for  $\mathbb{Z}_{12}$

0	1	2	3	4	5	6	7	8	9	10	11
1	2	3	4	5	6	7	8	9	10	11	
2	4	6	8	10	0	2	4	6	8	10	
3	6	9	0	3	6	9	0	3	6	9	
4	8	0	4	8	0	4	8	0	4	8	
5	10	3	8	1	6	11	4	9	2	7	
6	0	6	0	6	0	6	0	6	0	6	
7	2	9	4	11	6	1	8	3	10	5	
8	4	0	8	4	0	8	4	0	8	4	
9	6	3	0	9	6	3	0	9	6	3	
10	8	6	4	2	0	10	8	6	4	2	
11	10	9	8	7	6	5	4	3	2	1	

b) Which integers have a multiplicative inverse modulo 12?

[1, 5, 7, 11]

c) Do the same for  $Z_{11}$ . Which numbers have mult.inverse  $\text{mod } 11$ ?

[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

d) Find the multiplicative inverse to 11 *modulo* 29 by trial and error, ie. just try different values.

([1, 5, 7, 11], [1, 2, 3, 4, 5, 6, 7, 8, 9, 10], 8)

e) Formulate a condition for  $a$  to have a multiplicative inverse modulo  $n$ .

Hint: It involves the factorisations of  $a$  and  $n$ .

An integer  $a \in Z_n$  has a multiplicative inverse modulo  $n$  if and only if  $\gcd(a, n) = 1$ , i.e.  $a$  and  $n$  are coprime.

## Problem 03 – Affine ciphers

We use small letters a-z for plain text, and cipher texts with capital letters, to distinguish the plain texts from cipher text, but they represent the same alphabet, i.e. there are 26 letters. We encode the letters with numbers from 0 to 25, considered as elements in  $Z_{26}$ , the integers modulo 26.

The function  $e_k : Z_{26} \rightarrow Z_{26}$  is given by the formula

$$e_k(x) = (3 \cdot x + 11) \text{ mod } 26$$

The key is the pair  $k = (3, 11)$

a) Write  $e_k$  as a permutation, i.e. the sequence of letters we get when encrypting  $a, b, c$  etc.

$$'a' \rightarrow 'L', 'b' \rightarrow 'O', 'c' \rightarrow 'R', \dots, 'z' \rightarrow 'I'$$

Thus, the sequence of letters we get when encrypting  $\{a, b, c, \dots, z\}$  is:

LORUXADGJMPSVYBEHKNQTWZCFI

b) Use  $e_k$  to encrypt the message  $m = \text{'alice'}$

$$m = \text{'LSJRX'}$$

**c) Find the inverse of  $e_k$  as a:**

- permutation as in part a)
  - as a formula  $d_k(y) = ay + b \pmod{26}$  (the decryption) where you have to determine  $a$  and  $b$ .
- Hint: Invert the formula for  $e_k$ , where you need to use a multiplicative inverse.

**d) Use the inverse d to decrypt  $c = RBKKXRQ$**

As a permutation, the decryption function reverses the encryption. Decrypted message:

$$RBKKXRQ \rightarrow \text{correct}$$

As a formula, the decryption function  $d_k(y) = a \cdot (y - b) \pmod{26}$  is:

$$d_k(y) = 9 \cdot (y - 11) \pmod{26}$$

where 9 is the multiplicative inverse of 3  $\pmod{26}$ .

**e) How secure is this cipher, compared to a rotation cipher? Consider both brute force and known plaintext attacks.**

Brute Force Attack:

- In a rotation cipher, there are only 26 possible keys, one for each shift. This makes it vulnerable to brute force attacks, since an attacker easily can run through all possible shifts.
- In an affine cipher, the number of keys is larger, because it involves two variables,  $a$  and  $b$ , where  $a$  must be coprime with 26. While it's still vulnerable to brute force attacks, the increased number of keys makes it more secure than the rotation cipher.

Known Plaintext Attack

- Both of the ciphers are vulnerable to know plaintext attacks, but if the attacker can learn one or two pairs of plaintext and ciphertext, this could allow the attacker to deduce the key through solving a system of equations. On the other side, the increased keyspace from using the two variables, one of which must be coprime with 26, provides some additional difficulty to the attack.

**f) How many legal keys does are there for this choice of formula and alphabet?**

For an affine cipher with the formula  $e_k(x) = (a \cdot x + b) \pmod{26}$ :

- $a$  must be coprime with 26, meaning it can take values from the set  $\{1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25\}$ , which has 12 elements.
- $b$  can take any value from 0 to 25, which gives 26 possibilities.

That makes the total number of legal keys:

$$12 \cdot 26 = 312 \text{ keys}$$

## Problem 04

You (an eavesdropper) see the following message from Alice to Bob (Only letters are included, and then grouped into fives):

## RGMRQ ERQMZ MZXMD ENNZU QFD

You know they use a affine cipher. Use brute force to find plain text and key.

### Answer:

As established in the above problems, the encryption formula for an affine cipher is

$$e_k(x) = (a \cdot x + b) \bmod 26$$

where  $a$  must be coprime with 26. This limits the possible values for  $a$ :

1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25

In addition,  $b$  can only be a value between 0 and 25.

A brute force attack would then consist of iterating through all valid values of  $a$  and  $b$ , as defined above, to decrypt the message.

Using Python to write the code for brute forcing the encryption, the output is as follows:

```
Key (a=1, b=0) -> Decrypted Text: RGMRQERQMZMXMDENNZUQFD
Key (a=1, b=1) -> Decrypted Text: QFLQPDQPLYLYWLCDMMYTPEC
Key (a=1, b=2) -> Decrypted Text: PEKPOCPOKXXVKBCLLXSODB
Key (a=1, b=3) -> Decrypted Text: ODJONBONJWJWUJABKKWRNCA
Key (a=1, b=4) -> Decrypted Text: NCINMANMIVIVTIZAJJVQMBZ
Key (a=1, b=5) -> Decrypted Text: MBHMLZMLHUHUSHYZIIUPLAY
Key (a=1, b=6) -> Decrypted Text: LAGLKYLKGTGTRGXHYHTOKZX
Key (a=1, b=7) -> Decrypted Text: KZFKJXKJFSFSQFWXGGSNJYW
Key (a=1, b=8) -> Decrypted Text: JYEJIWJIERERPEVWFFRMIXV
Key (a=1, b=9) -> Decrypted Text: IXDIHVIHDQDQODUVEEQLHWU
Key (a=1, b=10) -> Decrypted Text: HWCHGUHGCPNCTUDDPKGVT
Key (a=1, b=11) -> Decrypted Text: GVBGFTGFBOBOMBSTCCOJFUS
Key (a=1, b=12) -> Decrypted Text: FUAFESFEANANLARSBBNIETR
Key (a=1, b=13) -> Decrypted Text: ETZEDREDZMZXKZQRAAMHDSQ
Key (a=1, b=14) -> Decrypted Text: DSYDCQDCYLYLJYPQZZLGCRP
Key (a=1, b=15) -> Decrypted Text: CRXCBPCBXXKIXOPYYKFBQO
Key (a=1, b=16) -> Decrypted Text: BQWBAOBAWJWJHWNXXXJEAPN
Key (a=1, b=17) -> Decrypted Text: APVAZNAZVIVIGVMNWIDZOM
Key (a=1, b=18) -> Decrypted Text: ZOUZYMZYUHUHFULMVVHCYNL
Key (a=1, b=19) -> Decrypted Text: YNTYXLYXTGTGETKLUUGBXMK
Key (a=1, b=20) -> Decrypted Text: XMSXWKXWSFSFDSJKTTFAWLJ
Key (a=1, b=21) -> Decrypted Text: WLRWVJWVRERECRIJSSEZVKI
Key (a=1, b=22) -> Decrypted Text: VKQVUIVUQDQDBQHIRRDYUJH
Key (a=1, b=23) -> Decrypted Text: UJPUTHUTPCPCAPGHQQCXTIG
Key (a=1, b=24) -> Decrypted Text: TIOTSGTSOBOBZOFPPBWSHF
Key (a=1, b=25) -> Decrypted Text: SHNSRFSRANAYNEFOOAVRGE
Key (a=3, b=0) -> Decrypted Text: XCEXOKXOERERZEBKNNRYOTB
Key (a=3, b=1) -> Decrypted Text: OTVOFBQFVIVIQVSBEIIPFKS
Key (a=3, b=2) -> Decrypted Text: FKMFSFWMZMZHJJSVVZGWB
Key (a=3, b=3) -> Decrypted Text: WBDWNJWNDQDQYDAJMMQXNSA
Key (a=3, b=4) -> Decrypted Text: NSUNEANEUHUHPURADDH0EJR
Key (a=3, b=5) -> Decrypted Text: EJLEVREVLVLYGLIRUUYFVAI
Key (a=3, b=6) -> Decrypted Text: VACVMIVMCPCPCZILLPWRMZ
Key (a=3, b=7) -> Decrypted Text: MRTMDZMDTGTGTQZCCGNDIQ
Key (a=3, b=8) -> Decrypted Text: DIKDUQDUKXXFKHQTTEUZH
Key (a=3, b=9) -> Decrypted Text: UZBULHULBOBOWBYHKKOVLQY
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Key (a=3, b=10) -> Decrypted Text: LQSLCYLCSFSFNSPYBBFMCHP  
Key (a=3, b=11) -> Decrypted Text: CHJCTPCTJWJWEJGPSSWDTYG  
Key (a=3, b=12) -> Decrypted Text: TYATKGTKANANVAXGJJNUKPX  
Key (a=3, b=13) -> Decrypted Text: KPRKBXKBREREMROXAAELBGO  
Key (a=3, b=14) -> Decrypted Text: BGIBSOBSIVIVDIFORRVCSXF  
Key (a=3, b=15) -> Decrypted Text: SXZSJFSJZMZMUZWFIMTJOW  
Key (a=3, b=16) -> Decrypted Text: JOQJAWJAQDQDLQNWZZDKAFN  
Key (a=3, b=17) -> Decrypted Text: AFHARNARHUHUCHENQQUBRWE  
Key (a=3, b=18) -> Decrypted Text: RWYRIERIYLYLTYVEHHSINV  
Key (a=3, b=19) -> Decrypted Text: INPIZVIZPCPCPMVYYCJZEM  
Key (a=3, b=20) -> Decrypted Text: ZEGZQMZQGTGTBGDMPPTAQVD  
Key (a=3, b=21) -> Decrypted Text: QVXQHDQHXXKXSUDGGKRHMU  
Key (a=3, b=22) -> Decrypted Text: HMOHYUHYOB0BJOLUXXBIYDL  
Key (a=3, b=23) -> Decrypted Text: YDFYPLYPFSSAFCL00SZPUC  
Key (a=3, b=24) -> Decrypted Text: PUWPGCPGWJWRWTCFFJQGLT  
Key (a=3, b=25) -> Decrypted Text: GLNGXTGXNANAINKTWVAHXCK  
Key (a=5, b=0) -> Decrypted Text: TWSTYGTYSFSFSLGNNFEYBL  
Key (a=5, b=1) -> Decrypted Text: YBXYDLYDXKKXQLSSKJDGQ  
Key (a=5, b=2) -> Decrypted Text: DGCDIQDICPCPCZCVXXP0ILV  
Key (a=5, b=3) -> Decrypted Text: ILHINVINHUEHAVCCUTNQA  
Key (a=5, b=4) -> Decrypted Text: NQMNSANSMZMZJMFHHZYSVF  
Key (a=5, b=5) -> Decrypted Text: SVRSXFSXREEROKFMEDXAK  
Key (a=5, b=6) -> Decrypted Text: XAWXCKXCWJWJTWPKRRJICFP  
Key (a=5, b=7) -> Decrypted Text: CFBCHPCHBOBOYBUPWONHKU  
Key (a=5, b=8) -> Decrypted Text: HKGHMUHMGTDGZUBBTSMPZ  
Key (a=5, b=9) -> Decrypted Text: MPLMRZMRLYLILEZGGYXRUE  
Key (a=5, b=10) -> Decrypted Text: RUQRWERWQDQDNQJELLDCWZJ  
Key (a=5, b=11) -> Decrypted Text: WZVWBJBWBIVISVOJQQIHBE0  
Key (a=5, b=12) -> Decrypted Text: BEABGOBGANANXATOVVNMGT  
Key (a=5, b=13) -> Decrypted Text: GJFGLTGLFSFSCFYTAASRLOY  
Key (a=5, b=14) -> Decrypted Text: LOKLQYLQKXKXHKDYFFXWQTD  
Key (a=5, b=15) -> Decrypted Text: QTPQVDQVPCPCMPIDKKCBVYI  
Key (a=5, b=16) -> Decrypted Text: VYUVAIVAUHUHRUNIPPHGADN  
Key (a=5, b=17) -> Decrypted Text: ADZAFNAFZMZMWZSNUMLFIS  
Key (a=5, b=18) -> Decrypted Text: FIEFKSFKERERBEXSZZRQKNX  
Key (a=5, b=19) -> Decrypted Text: KNJKPXKPJWJWJCXEEWVPSC  
Key (a=5, b=20) -> Decrypted Text: PSOPUCPU0B0BLOHCJJBAUXH  
Key (a=5, b=21) -> Decrypted Text: UXTUZHUZTGTGQTMH00GFZCM  
Key (a=5, b=22) -> Decrypted Text: ZCYZEMZEYLYLVYRMTTLKEHR  
Key (a=5, b=23) -> Decrypted Text: EHDEJREJDQDQADWRYQPJMW  
Key (a=5, b=24) -> Decrypted Text: JMIJOWJOIVIVFIBWDDVUORB  
Key (a=5, b=25) -> Decrypted Text: ORNOTBOTNANAKNGBIAZTWG  
Key (a=7, b=0) -> Decrypted Text: VMYVGIVGYLYLHYTINNLOGXT  
Key (a=7, b=1) -> Decrypted Text: GXJGRTGRJWJWSJETYYWZRIE  
Key (a=7, b=2) -> Decrypted Text: RIURCERCUHUH0UPEJJHKCTP  
Key (a=7, b=3) -> Decrypted Text: CTFNCPNFSFSOFAPUUSVNEA  
Key (a=7, b=4) -> Decrypted Text: NEQNYANYQDQDZQLAFFDGYPL  
Key (a=7, b=5) -> Decrypted Text: YPBYJLYJB0B0KBWLQQORJAW  
Key (a=7, b=6) -> Decrypted Text: JAMJUWJUMZMZVMHWWBZCULH  
Key (a=7, b=7) -> Decrypted Text: ULXUFHUFXXKXGSHMMKNFWS  
Key (a=7, b=8) -> Decrypted Text: FWIFQSFQIVIVRIDSXXVYQHD  
Key (a=7, b=9) -> Decrypted Text: QHTQBDQBTGTGCTODIIGJBS0  
Key (a=7, b=10) -> Decrypted Text: BSEBMOBMERERNEZOTTRUMDZ  
Key (a=7, b=11) -> Decrypted Text: MDPMXZMXPCPCYPKZEECFXOK  
Key (a=7, b=12) -> Decrypted Text: XOAXIKXIANANJAVKPPNQIZV  
Key (a=7, b=13) -> Decrypted Text: IZLITVITLYLYULGVAAYBTKG

Key (a=7, b=14) -> Decrypted Text: TKWTEGTEWJWJFWRGLLJMEVR  
Key (a=7, b=15) -> Decrypted Text: EVHEPREPHUHUQHCRWWUXPGC  
Key (a=7, b=16) -> Decrypted Text: PGSPACPASFBSNCHHFIARN  
Key (a=7, b=17) -> Decrypted Text: ARDALNALDQDQMDYNSSQTLCY  
Key (a=7, b=18) -> Decrypted Text: LCOLWYLWOBBOBXOJYDDBEWNJ  
Key (a=7, b=19) -> Decrypted Text: WNZWHJWHZMZMIZUJJOOMPHYU  
Key (a=7, b=20) -> Decrypted Text: HYKHSUHSKXKXTKFUZZXASJF  
Key (a=7, b=21) -> Decrypted Text: SJVSDFSDVIVIEVQFKKILDUQ  
Key (a=7, b=22) -> Decrypted Text: DUGDOQDOGTGTPGBQVVTWOFB  
Key (a=7, b=23) -> Decrypted Text: OFROZBOZREREARMBGGEHZQM  
Key (a=7, b=24) -> Decrypted Text: ZQCZKMZKPCPLCXMRPSKBX  
Key (a=7, b=25) -> Decrypted Text: KBNKVXKVNANAWNIXCCADVMI  
Key (a=9, b=0) -> Decrypted Text: ZSKZWMZWKXKXKJMNXIWPJ  
Key (a=9, b=1) -> Decrypted Text: WPHWTJWTHUHUOHGJKKUFTMG  
Key (a=9, b=2) -> Decrypted Text: TMETQGTQERERLEDGHHRCQJD  
Key (a=9, b=3) -> Decrypted Text: QJBQNDQNBBOBIBADEEOZNGA  
Key (a=9, b=4) -> Decrypted Text: NGYNKANKYLYLFYXABBLWKDX  
Key (a=9, b=5) -> Decrypted Text: KDVKHXXHVIVICVUXYYITHAU  
Key (a=9, b=6) -> Decrypted Text: HASHEUHESFSFZSRUVVFQEXR  
Key (a=9, b=7) -> Decrypted Text: EXPEBREBPCPCWPORSSCNBUO  
Key (a=9, b=8) -> Decrypted Text: BUMBYOBYMZMTMLOPPZKYRL  
Key (a=9, b=9) -> Decrypted Text: YRJYVLYVJWJWQJILMMWHVOI  
Key (a=9, b=10) -> Decrypted Text: VOGVSIVSGTGNGFIJJTESLF  
Key (a=9, b=11) -> Decrypted Text: SLDSPFSPDQDQKDCFGQBPIK  
Key (a=9, b=12) -> Decrypted Text: PIAPMCPMANANHAZCDDNYMFZ  
Key (a=9, b=13) -> Decrypted Text: MFXMJZMJXKXKEXWZAAKVJCW  
Key (a=9, b=14) -> Decrypted Text: JCUJGWJGUHUHBUTWXXHSGZT  
Key (a=9, b=15) -> Decrypted Text: GZRGDTGDREREYRQTUUEPDWQ  
Key (a=9, b=16) -> Decrypted Text: DWODAQDAOBOBVONQRRBMATN  
Key (a=9, b=17) -> Decrypted Text: ATLAXNAXLYLYSLKNOOYJXQK  
Key (a=9, b=18) -> Decrypted Text: XQIXUKXUIVIVPIHKLLVGUNH  
Key (a=9, b=19) -> Decrypted Text: UNFURHURFSFSMFEHIISDRKE  
Key (a=9, b=20) -> Decrypted Text: RKCROEROCPCPJCBEFFPAOHB  
Key (a=9, b=21) -> Decrypted Text: OHZOLBOLZMZMGZYBCCMXLEY  
Key (a=9, b=22) -> Decrypted Text: LEWLIYLIWJWJDWVYZZJUIBV  
Key (a=9, b=23) -> Decrypted Text: IBTIFVIFTGTGATSVWWGRFYS  
Key (a=9, b=24) -> Decrypted Text: FYQFCSFCQDQDXQPSTTDQVCP  
Key (a=9, b=25) -> Decrypted Text: CVNCZPCZNANAUNMPQQALZSM  
Key (a=11, b=0) -> Decrypted Text: LKULSYLSUHUHVUFYNNHQSRF  
Key (a=11, b=1) -> Decrypted Text: SRBSZFSZBBOCBMFUUXZYM  
Key (a=11, b=2) -> Decrypted Text: ZYIZGMZGIVIVJITMBBVEGFT  
Key (a=11, b=3) -> Decrypted Text: GFGNTGNPCPCQPATIIICLNMA  
Key (a=11, b=4) -> Decrypted Text: NMWNUANUWJWJXWAPPJSUTH  
Key (a=11, b=5) -> Decrypted Text: UTDUBHUBDQDQEDOHWWQZBAO  
Key (a=11, b=6) -> Decrypted Text: BAKBIOBIKXKXKLVODDXGIHV  
Key (a=11, b=7) -> Decrypted Text: IHRIPVIPRERESRCVKKENPOC  
Key (a=11, b=8) -> Decrypted Text: POYPWCPWYLYLZYJCRRLUWVJ  
Key (a=11, b=9) -> Decrypted Text: WFWWDJWDFSFGFQJYYSBDCQ  
Key (a=11, b=10) -> Decrypted Text: DCMDKQDKMZMZNMXQFFZIKJX  
Key (a=11, b=11) -> Decrypted Text: KJTKRXKRTGTGUTEXMMGPRQE  
Key (a=11, b=12) -> Decrypted Text: RQARYERYANANBALETTNWXYL  
Key (a=11, b=13) -> Decrypted Text: YXHYFLYFHUHUHISLAAUDFES  
Key (a=11, b=14) -> Decrypted Text: FEOFMSFMOBPOZSHHBKMLZ  
Key (a=11, b=15) -> Decrypted Text: MLVMTZMTVIVIWVGZ00IRTSG  
Key (a=11, b=16) -> Decrypted Text: TSCTAGTACPCPDNGVVPYAZN  
Key (a=11, b=17) -> Decrypted Text: AZJAHNAHJWJWKJUNCCWFHGU

Key (a=11, b=18) -> Decrypted Text: HGQHOUHQDQDRQBUJJDMONB  
Key (a=11, b=19) -> Decrypted Text: ONXOVBOVXKXKYIBQQKTVUI  
Key (a=11, b=20) -> Decrypted Text: VUEVCIVCERERFEPIXXRACBP  
Key (a=11, b=21) -> Decrypted Text: CBL CJPCJLYLYMLWPEEYHJIW  
Key (a=11, b=22) -> Decrypted Text: JISJQWJQSFSFTSDWLLFOQPD  
Key (a=11, b=23) -> Decrypted Text: QPZQXDQXZMMAZKDSSMVXWK  
Key (a=11, b=24) -> Decrypted Text: XWGXEKXEGTGTGHRKZZTCEDR  
Key (a=11, b=25) -> Decrypted Text: EDNELRELNANAONYRGGAJLKY  
Key (a=15, b=0) -> Decrypted Text: PQGPICPIGTGTGVCNNTKIJV  
Key (a=15, b=1) -> Decrypted Text: IJZIBVIBZMZYZOVGGMDBC  
Key (a=15, b=2) -> Decrypted Text: BCSBUOBUSFSFRSHOZZFWUVH  
Key (a=15, b=3) -> Decrypted Text: UVLUNHUNLYLYKLAHSSYPNOA  
Key (a=15, b=4) -> Decrypted Text: NOENGANGERERDETALLRIGHT  
Key (a=15, b=5) -> Decrypted Text: GHXGZTGZXKXKXMTTEKBZAM  
Key (a=15, b=6) -> Decrypted Text: ZAQZSMZSQDQDPQFMXXDUSTF  
Key (a=15, b=7) -> Decrypted Text: STJSLFSLJWJWIJYFQQWNLMY  
Key (a=15, b=8) -> Decrypted Text: LMCLEYLEPCPCBCRYJJPGEFR  
Key (a=15, b=9) -> Decrypted Text: EFVEXREXVIVIUVKRCCIZXYK  
Key (a=15, b=10) -> Decrypted Text: XYOXQKXQOBONODKVVBSQRD  
Key (a=15, b=11) -> Decrypted Text: QRHQJDQJHUHUGHWD00ULJKW  
Key (a=15, b=12) -> Decrypted Text: JKAJCWJCANANZAPWHHNECDP  
Key (a=15, b=13) -> Decrypted Text: CDTVCVPTGTGSTIPAAGXVWI  
Key (a=15, b=14) -> Decrypted Text: VWMVOIVOMZMLBITTZQOPB  
Key (a=15, b=15) -> Decrypted Text: OPFOHBOHFSFSEFUBMMSJHIU  
Key (a=15, b=16) -> Decrypted Text: HIYHAUHAYLYLYXNUFFLCABN  
Key (a=15, b=17) -> Decrypted Text: ABRATNATREREQRGNYEVTUG  
Key (a=15, b=18) -> Decrypted Text: TUKTMGTMKXKXJKZGRRXOMNZ  
Key (a=15, b=19) -> Decrypted Text: MNDMFZMFDQDQCD SZKKQHFGS  
Key (a=15, b=20) -> Decrypted Text: FGWFYSFYWJWJVWLSDDJAYZL  
Key (a=15, b=21) -> Decrypted Text: YZPYRLYRCPCEPELWWCTRSE  
Key (a=15, b=22) -> Decrypted Text: RSIRKERKIVIVHIXEPPVMKLX  
Key (a=15, b=23) -> Decrypted Text: KLBKDXKDBOBOABQXIIOFDEQ  
Key (a=15, b=24) -> Decrypted Text: DEUDWQDUWUHTUJQBBHYWXJ  
Key (a=15, b=25) -> Decrypted Text: WXNWPJWPANAMNCJUUARQC  
Key (a=17, b=0) -> Decrypted Text: BIQBEQBEQDQDJQRONNDSER  
Key (a=17, b=1) -> Decrypted Text: ELTEHREHTGTGMTURQQGVHOU  
Key (a=17, b=2) -> Decrypted Text: HOWHKUHKWJWPXUTTJYKRX  
Key (a=17, b=3) -> Decrypted Text: KRZKNXKNZMMSZAXWMBNUA  
Key (a=17, b=4) -> Decrypted Text: NUCNQANQCPCPVCDAZZPEQXD  
Key (a=17, b=5) -> Decrypted Text: QXFQTDQTFSSYFGDCCSHTAG  
Key (a=17, b=6) -> Decrypted Text: TAITWGTWIVIVBIJGFFVKWDJ  
Key (a=17, b=7) -> Decrypted Text: WDLWZJWZLYLYELMJIIYNZGM  
Key (a=17, b=8) -> Decrypted Text: ZGOZCMZCOBOBHOPMLLBQCJP  
Key (a=17, b=9) -> Decrypted Text: CJRCFPCFREREKRSP00ETFMS  
Key (a=17, b=10) -> Decrypted Text: FMUFISFIUHUHNUVSRRHWIPV  
Key (a=17, b=11) -> Decrypted Text: IPXILVILXKXKQXYVUUKZLSY  
Key (a=17, b=12) -> Decrypted Text: LSALOYLOANANTABYXXNCOVB  
Key (a=17, b=13) -> Decrypted Text: OVDORBORDQDQWDEBAAQFRYE  
Key (a=17, b=14) -> Decrypted Text: RYGRUERUGTGTZGHEDDTIUBH  
Key (a=17, b=15) -> Decrypted Text: UBJUXHUXJWJWCJKHGGWLXEK  
Key (a=17, b=16) -> Decrypted Text: XEMXAKXAMZMFMNKJJZOAHN  
Key (a=17, b=17) -> Decrypted Text: AHPADNADPCPCIPQNMCCRDKQ  
Key (a=17, b=18) -> Decrypted Text: DKSDGQDGSFSFLSTQPPFUGNT  
Key (a=17, b=19) -> Decrypted Text: GNVGJTGJVIVIOVWTSSIXJQW  
Key (a=17, b=20) -> Decrypted Text: JQYJMWJMYLYLRYZWVVLAMTZ  
Key (a=17, b=21) -> Decrypted Text: MTBMPZMPBOBOUBCZYYODPWC



Key (a=17, b=22) -> Decrypted Text: PWEPCSPSERERXEFCCBRGSZF  
Key (a=17, b=23) -> Decrypted Text: SZHSVFSVHUHUAHIFEEUJVCI  
Key (a=17, b=24) -> Decrypted Text: VCKVYIVYKXKXDKLIHHXMYFL  
Key (a=17, b=25) -> Decrypted Text: YFNYBLYBNANAGNOLKKAPBIO  
Key (a=19, b=0) -> Decrypted Text: FOCFUSFUCPCPTCHSNNPMUDH  
Key (a=19, b=1) -> Decrypted Text: UDRUJHUJREREIRWHCCEBJSW  
Key (a=19, b=2) -> Decrypted Text: JSGJYWJYGTGTXLWRRTQYHL  
Key (a=19, b=3) -> Decrypted Text: YHVYNLYNVIVIMVALGGIFNWA  
Key (a=19, b=4) -> Decrypted Text: NWKNCANCKXKXBKPAVVXUCLP  
Key (a=19, b=5) -> Decrypted Text: CLZCRPCRZMZMQZEPKKMJRAE  
Key (a=19, b=6) -> Decrypted Text: RAORGERGOB0BF0TEZZBYGPT  
Key (a=19, b=7) -> Decrypted Text: GPDGVTGVDQDQUDIT00QNVEI  
Key (a=19, b=8) -> Decrypted Text: VESVKIVKSFSFJSXIDDFCKTX  
Key (a=19, b=9) -> Decrypted Text: KTHKZXKZHUHUYHMXSSURZIM  
Key (a=19, b=10) -> Decrypted Text: ZIWZOMZOWJWJNWBMMHJGOXB  
Key (a=19, b=11) -> Decrypted Text: OXLODBODLYLYCLQBWWYVDMQ  
Key (a=19, b=12) -> Decrypted Text: DMADSQDSANANRAFQLLNKSBF  
Key (a=19, b=13) -> Decrypted Text: SBPSHFSHPCPCGUFACZHQU  
Key (a=19, b=14) -> Decrypted Text: HQEHUHWERERVEJUPPROWFJ  
Key (a=19, b=15) -> Decrypted Text: WFTWLJWLTGTGKTYJEEGLUY  
Key (a=19, b=16) -> Decrypted Text: LUILAYLAIVIVZINYTTVSAJN  
Key (a=19, b=17) -> Decrypted Text: AJXAPNAPXKXKXCNIIKHPYC  
Key (a=19, b=18) -> Decrypted Text: PYMPECEPMZMZDMRCXXZWENR  
Key (a=19, b=19) -> Decrypted Text: ENBETRETB0B0SBGRMMOLTCG  
Key (a=19, b=20) -> Decrypted Text: TCQTIGTIQDQDHQVGBBDAIRV  
Key (a=19, b=21) -> Decrypted Text: IRFIXVIXFSFSWFKVQQSPXGK  
Key (a=19, b=22) -> Decrypted Text: XGUXMKXMUHHLUZKFFHEMVZ  
Key (a=19, b=23) -> Decrypted Text: MVJMBZMBJWJWAJOZUUWTBKO  
Key (a=19, b=24) -> Decrypted Text: BKYBQOBQYLYLPYDOJJLIQZD  
Key (a=19, b=25) -> Decrypted Text: QZNQFDQFNANAENSYYAXFOS  
Key (a=21, b=0) -> Decrypted Text: HEIHCUHCIVIVLIPUNNVWCZP  
Key (a=21, b=1) -> Decrypted Text: CZDCXPCXDQDQGDKPIIQRXUK  
Key (a=21, b=2) -> Decrypted Text: XUYXSKXSYLELYBFKDDLMSPF  
Key (a=21, b=3) -> Decrypted Text: SPTS NFSNTGTGWTAFYYGHNKA  
Key (a=21, b=4) -> Decrypted Text: NKONIANIOB0BROVATTBCIFV  
Key (a=21, b=5) -> Decrypted Text: IFJIDVIDJWJWJQV00WXDAQ  
Key (a=21, b=6) -> Decrypted Text: DAEDYQDYERERHELQJJRSYVL  
Key (a=21, b=7) -> Decrypted Text: YVZYTLYTZMZMCZGLEEMNTQG  
Key (a=21, b=8) -> Decrypted Text: TQUTOGTOUHUHUBGZZHIOLB  
Key (a=21, b=9) -> Decrypted Text: OLPOJBOJPCPCSPWBUUCDJGW  
Key (a=21, b=10) -> Decrypted Text: JGKJEWJEKXKXNKRWPPXYEBR  
Key (a=21, b=11) -> Decrypted Text: EBFEZREZFSFIFMRKKSTZWM  
Key (a=21, b=12) -> Decrypted Text: ZWAZUMZUANANDAHMFFNOURH  
Key (a=21, b=13) -> Decrypted Text: URVUPHUPVIVIVYCHAAIJPMC  
Key (a=21, b=14) -> Decrypted Text: PMQPKCPKQDQDTQXCVVDEKHX  
Key (a=21, b=15) -> Decrypted Text: KHLKFXXFLYLYOLSXQQYZFCS  
Key (a=21, b=16) -> Decrypted Text: FCGFASFAGTGTJGNSLLTUAXN  
Key (a=21, b=17) -> Decrypted Text: AXBAVNAVBOBOEBINGGOPVSI  
Key (a=21, b=18) -> Decrypted Text: VSWVQIVQWJWJZWIDIBBJKQND  
Key (a=21, b=19) -> Decrypted Text: QNRQLDQLREREURYDWWEFLIY  
Key (a=21, b=20) -> Decrypted Text: LIMLGYLGMZMPMTYRRZAGDT  
Key (a=21, b=21) -> Decrypted Text: GDHGBTGBHUHUKHOTMMUVBYO  
Key (a=21, b=22) -> Decrypted Text: BYCBWOBWCPCPFCJOHHPQWTJ  
Key (a=21, b=23) -> Decrypted Text: WTXWRJWRXKXKAXEJCCKLROE  
Key (a=21, b=24) -> Decrypted Text: ROSRMERMSFSFVSZEXXFGMJZ  
Key (a=21, b=25) -> Decrypted Text: MJNMHZMHNANAQNUZSSABHEU



Key (a=23, b=0) -> Decrypted Text: DYWDMQDMWJWBWZQNNJCMHZ  
Key (a=23, b=1) -> Decrypted Text: MHFMVZMVFSFSKFIZWWSLVQI  
Key (a=23, b=2) -> Decrypted Text: VQOVEIVEOB0BTORIFFBUEZR  
Key (a=23, b=3) -> Decrypted Text: EZXENRENXXKXCXAR00KDZIA  
Key (a=23, b=4) -> Decrypted Text: NIGNWANWGTGTLGJAXXTMWRJ  
Key (a=23, b=5) -> Decrypted Text: WRPWFJWFPCPCUPSJGGCVFAS  
Key (a=23, b=6) -> Decrypted Text: FAYF0SFOYLYLDYBSPPLE0JB  
Key (a=23, b=7) -> Decrypted Text: OJHOXBOXHUHUMHKBYUNXSK  
Key (a=23, b=8) -> Decrypted Text: XSQXGKXGQDQDVQTKHHDWGBT  
Key (a=23, b=9) -> Decrypted Text: GBZGPTGPZMZMEZCTQQMFPKC  
Key (a=23, b=10) -> Decrypted Text: PKIPYCPYIVIVNILCZZVOYTL  
Key (a=23, b=11) -> Decrypted Text: YTRYHLYHREREWULIIEHXCU  
Key (a=23, b=12) -> Decrypted Text: HCAHQHQANANFADURRNGQLD  
Key (a=23, b=13) -> Decrypted Text: QLJQZDQZJWJW0JMDAAWPZUM  
Key (a=23, b=14) -> Decrypted Text: ZUSZIMZISFSFXSVMJJFYIDV  
Key (a=23, b=15) -> Decrypted Text: IDBIRVIRB0B0GBEVSSOHRME  
Key (a=23, b=16) -> Decrypted Text: RMKRAERAKXXPKNEBBXQAVN  
Key (a=23, b=17) -> Decrypted Text: AVTAJNAJTGTYWNKKGZJEW  
Key (a=23, b=18) -> Decrypted Text: JECJSWJSCPCPHCFWTPISNF  
Key (a=23, b=19) -> Decrypted Text: SNLSBFSBLYLYQLOFCCYRBWO  
Key (a=23, b=20) -> Decrypted Text: BWUBKOBKUH0H0ZUX0LLHAKFX  
Key (a=23, b=21) -> Decrypted Text: KFDKTXKTDQDQIDGXUUQJTOG  
Key (a=23, b=22) -> Decrypted Text: TOMTCGTCMZMRMPGDDZSCXP  
Key (a=23, b=23) -> Decrypted Text: CXVCLPCLVIVIAVYPMIIBLGY  
Key (a=23, b=24) -> Decrypted Text: LGELUYLUERERJEHYVVRKUPH  
Key (a=23, b=25) -> Decrypted Text: UPNUDHU0NANASNQHEEATDYQ  
Key (a=25, b=0) -> Decrypted Text: JU0JKWJK0B0BDOXWNNBGKVX  
Key (a=25, b=1) -> Decrypted Text: KVPKLXKLPCPEPYX00CHLWY  
Key (a=25, b=2) -> Decrypted Text: LWQLMYLMQDQDFQZYPPDIMXZ  
Key (a=25, b=3) -> Decrypted Text: MXRMNZMNREREGRAZQ0EJNYA  
Key (a=25, b=4) -> Decrypted Text: NYSNOAN0SFSFHSBARRFK0ZB  
Key (a=25, b=5) -> Decrypted Text: OZTOPB0PTGTGTCBSSGLPAC  
Key (a=25, b=6) -> Decrypted Text: PAUPQCPQUHUHJUDCTTHMQBD  
Key (a=25, b=7) -> Decrypted Text: QBVQRDQRVIVIKVEDU0INRCE  
Key (a=25, b=8) -> Decrypted Text: RCWRSERSWJWJLWFEVVJ0SDF  
Key (a=25, b=9) -> Decrypted Text: SDXSTFSTXKXKMGFWWKPT0EG  
Key (a=25, b=10) -> Decrypted Text: TEYTUGTU0YLYLNYHGXXLQUFH  
Key (a=25, b=11) -> Decrypted Text: UFZUVHUVZM0Z0ZIHYYMRVGI  
Key (a=25, b=12) -> Decrypted Text: VGAVWIVWANANPAJIZZNSWHJ  
Key (a=25, b=13) -> Decrypted Text: WHBW0JWXB0B0QBKJAA0TXIK  
Key (a=25, b=14) -> Decrypted Text: XICXYKXYCPCPRCLKB0PUYJL  
Key (a=25, b=15) -> Decrypted Text: YJDY0LYZDQDQSDMLCCQVZKM  
Key (a=25, b=16) -> Decrypted Text: ZKEZAMZAERERTENMDDRWALN  
Key (a=25, b=17) -> Decrypted Text: ALFABNABFSF0UFONEESXBMO  
Key (a=25, b=18) -> Decrypted Text: BMGBC0BCGTGTGVP0FFT0YCNP  
Key (a=25, b=19) -> Decrypted Text: CNHCDPCDHUHUWHQPGGUZD0Q  
Key (a=25, b=20) -> Decrypted Text: D0IDEQDEIVIVXIRQHHVAEPR  
Key (a=25, b=21) -> Decrypted Text: EPJEFREFJWJWYJSRII0WBFQS  
Key (a=25, b=22) -> Decrypted Text: FQKFGSFGKXKXZKTSJJXCGR0T  
Key (a=25, b=23) -> Decrypted Text: GRLGHTGHLYLYALUTKKYDHSU  
Key (a=25, b=24) -> Decrypted Text: HSMHIUHIMZM0BMVULLZEITV  
Key (a=25, b=25) -> Decrypted Text: ITNIJVIJNANACNWMMAFJUW  
Key (a=1, b=0) -> Decrypted Text: RGM0RQ0RQM0ZMXMDENN0ZUQFD  
Key (a=1, b=1) -> Decrypted Text: QFLQPDQPLYLYWLCDDMMYTPEC  
Key (a=1, b=2) -> Decrypted Text: PEKPOCP0KXKXVKBCLLXS0DB  
Key (a=1, b=3) -> Decrypted Text: ODJONBONJWJWUJABKKWRNCA

Key (a=1, b=4) -> Decrypted Text: NCINMANMIVIVTIZAJJVQMBZ  
Key (a=1, b=5) -> Decrypted Text: MBHMLZMLHUHUSHYZIIUPLAY  
Key (a=1, b=6) -> Decrypted Text: LAGLKYLKGTGRGXHHOTKZX  
Key (a=1, b=7) -> Decrypted Text: KZFKJXKJFSFSQFWXGGSNJYW  
Key (a=1, b=8) -> Decrypted Text: JYEJIWJIERERPEVWFFRMIXV  
Key (a=1, b=9) -> Decrypted Text: IXDIHVIHDQDQODUVEEQLHWU  
Key (a=1, b=10) -> Decrypted Text: HWCHGUHGCPNCTUDDPKGVT  
Key (a=1, b=11) -> Decrypted Text: GVBGFTGFBOMBSTCCOJFUS  
Key (a=1, b=12) -> Decrypted Text: FUAFESFEANANLARSBBNIETR  
Key (a=1, b=13) -> Decrypted Text: ETZEDREDZMZKZQRAAMHDSQ  
Key (a=1, b=14) -> Decrypted Text: DSYDCQDCYLYLJYPQZZLGCRP  
Key (a=1, b=15) -> Decrypted Text: CRXCBCBCKXKIXOPYYKFBQO  
Key (a=1, b=16) -> Decrypted Text: BQWBAOBABWJWHWNOXXJEAPN  
Key (a=1, b=17) -> Decrypted Text: APVAZNAZVIVIGVMNWIDZOM  
Key (a=1, b=18) -> Decrypted Text: ZOUZYMZYUHUHFULMVVHCYNL  
Key (a=1, b=19) -> Decrypted Text: YNTYXLYXTGTGETKLUUGBXMK  
Key (a=1, b=20) -> Decrypted Text: XMSXWKXWSFSFDSJKTTFAWLJ  
Key (a=1, b=21) -> Decrypted Text: WLRWVJWVRERECRIJSSEZVKI  
Key (a=1, b=22) -> Decrypted Text: VKQVUIVUQDQDBQHRRDYUJH  
Key (a=1, b=23) -> Decrypted Text: UJPUTHUTPCPCAPGHQQCXTIG  
Key (a=1, b=24) -> Decrypted Text: TIOTSGTSOBBOZOFPPBWSHF  
Key (a=1, b=25) -> Decrypted Text: SHNSRFSRANAYNEFOOAVRGE  
Key (a=3, b=0) -> Decrypted Text: XCEXOKXOERERZEBKNNRYOTB  
Key (a=3, b=1) -> Decrypted Text: OTVOFBQFVIVIQVSBEIIPFKS  
Key (a=3, b=2) -> Decrypted Text: FKMFSFWMZMZHJSVVZGWB  
Key (a=3, b=3) -> Decrypted Text: WBDWNJWNDQDQYDAJMMQXNSA  
Key (a=3, b=4) -> Decrypted Text: NSUNEANEUHUHPURADDH0EJR  
Key (a=3, b=5) -> Decrypted Text: EJLEVREVLVLYGLIRUUYFVAI  
Key (a=3, b=6) -> Decrypted Text: VACVMIVMCPXPCZILLPWRZ  
Key (a=3, b=7) -> Decrypted Text: MRTMDZMDTGTGTQZCCGNDIQ  
Key (a=3, b=8) -> Decrypted Text: DIKDUQDUKXKXFKHQTTEUZH  
Key (a=3, b=9) -> Decrypted Text: UZBULHULBOBOWBYHKKOVLQY  
Key (a=3, b=10) -> Decrypted Text: LQSLCYLCSFSFNSPYBBFMCHP  
Key (a=3, b=11) -> Decrypted Text: CHJCTPCTJWJWJGPSSWDTYG  
Key (a=3, b=12) -> Decrypted Text: TYATKGTKANANVAXGJJNUKPX  
Key (a=3, b=13) -> Decrypted Text: KPRKBXKBREREMROXAAELBGO  
Key (a=3, b=14) -> Decrypted Text: BGIBSOBSIVIVDIFORRVCSXF  
Key (a=3, b=15) -> Decrypted Text: SXZSJFSJZMZMUZWFIMTJOW  
Key (a=3, b=16) -> Decrypted Text: JOQJAWJAQDQDLQNWZZDKAFN  
Key (a=3, b=17) -> Decrypted Text: AFHARNARHUHUCHENQQUBRWE  
Key (a=3, b=18) -> Decrypted Text: RWYRIERIYLYLTYVEHHSINV  
Key (a=3, b=19) -> Decrypted Text: INPIZVIZPCPKPMVYYCJZEM  
Key (a=3, b=20) -> Decrypted Text: ZEGZQMZQGTGTBGDMPPTAQVD  
Key (a=3, b=21) -> Decrypted Text: QVXQHDQHXXKXSXUDGGKRHMU  
Key (a=3, b=22) -> Decrypted Text: HMOHYUHYOB0BJOLUXXBIDYDL  
Key (a=3, b=23) -> Decrypted Text: YDFYPLYPFSSAFCL00SZPUC  
Key (a=3, b=24) -> Decrypted Text: PUWPGCPGWJWRWTCFFJQGLT  
Key (a=3, b=25) -> Decrypted Text: GLNGXTGXNANAINKTWVAHXCK  
Key (a=5, b=0) -> Decrypted Text: TWSTYGTYSFSFSLGNNFEYBL  
Key (a=5, b=1) -> Decrypted Text: YBXYDLYDXKKXUXQLSSKJDGQ  
Key (a=5, b=2) -> Decrypted Text: DGCDIQDICPCPZCVQXXPOILV  
Key (a=5, b=3) -> Decrypted Text: ILHINVINHUEHUEHAVCCUTNQA  
Key (a=5, b=4) -> Decrypted Text: NQMNSANSMZMZJMF0AHHZYSVF  
Key (a=5, b=5) -> Decrypted Text: SVRSXFSXREER0RKFMMEDXAK  
Key (a=5, b=6) -> Decrypted Text: XAWXCKXCWJWJTPKRRJICFP  
Key (a=5, b=7) -> Decrypted Text: CFBCHPCHBOBOYBUPWWONHKU

Key (a=5, b=8) -> Decrypted Text: HKGHMUHMTGTDGZUBBTSMPZ  
Key (a=5, b=9) -> Decrypted Text: MPLMRZMRLYLYILEZGGYXRUE  
Key (a=5, b=10) -> Decrypted Text: RUQRWERWQDQDNQJELLDCWZJ  
Key (a=5, b=11) -> Decrypted Text: WZVWBJBWBVIVISVOJQQIHBE0  
Key (a=5, b=12) -> Decrypted Text: BEABGOBGANANXATOVVNMGJT  
Key (a=5, b=13) -> Decrypted Text: GJFGLTGLFSFCFYTAASRLOY  
Key (a=5, b=14) -> Decrypted Text: LOKLQYLQKXKXHKDYFFXWQTD  
Key (a=5, b=15) -> Decrypted Text: QTPQVDQVPCPCMPIDKKCBVYI  
Key (a=5, b=16) -> Decrypted Text: VYUVAIVAUHUHRUNIPPHGADN  
Key (a=5, b=17) -> Decrypted Text: ADZAFNAFZMZMWZSNUUMLFIS  
Key (a=5, b=18) -> Decrypted Text: FIEFKSFKERERBEXSZZRQKNX  
Key (a=5, b=19) -> Decrypted Text: KNJKPKXPJWJWGJCXEEWVPSC  
Key (a=5, b=20) -> Decrypted Text: PSOPUCPU0B0BLOHCJJBAXXH  
Key (a=5, b=21) -> Decrypted Text: UXTUZHUTGTGTMTMOOGFZCM  
Key (a=5, b=22) -> Decrypted Text: ZCYZEMZEYLYLVYRMTTLKEHR  
Key (a=5, b=23) -> Decrypted Text: EHDEJREJDQDQADWRYYPJMW  
Key (a=5, b=24) -> Decrypted Text: JMIJOWJOIVIVFIBWDDVUORB  
Key (a=5, b=25) -> Decrypted Text: ORNOTBOTNANAKNGBIIAZTWG  
Key (a=7, b=0) -> Decrypted Text: VMYVGIVGYLYLHYTINNLOGXT  
Key (a=7, b=1) -> Decrypted Text: GXJGRTGRJWJSJETYYWZRIE  
Key (a=7, b=2) -> Decrypted Text: RIURCERCUHUH DUPEJJHKCTP  
Key (a=7, b=3) -> Decrypted Text: CTFNCPCNFSFSOFAPUUSVNEA  
Key (a=7, b=4) -> Decrypted Text: NEQNYANYQDQDZQLAFFDGYPL  
Key (a=7, b=5) -> Decrypted Text: YPBYJLYJB0B0KBWLQQORJAW  
Key (a=7, b=6) -> Decrypted Text: JAMJUWJUMZMZVMHWBZCULH  
Key (a=7, b=7) -> Decrypted Text: ULXUFHUFKXKXGXSHMMKNFWS  
Key (a=7, b=8) -> Decrypted Text: FWIFQSFQIVIVRIDSXXVYQHD  
Key (a=7, b=9) -> Decrypted Text: QHTQBDQBTGTGCTODIIGJBS0  
Key (a=7, b=10) -> Decrypted Text: BSEBMOBMERERNEZOTTRUMDZ  
Key (a=7, b=11) -> Decrypted Text: MDPMXZMXPCPCYPKZEECFXOK  
Key (a=7, b=12) -> Decrypted Text: XOAXIKXIANANJAVKPPNQIZV  
Key (a=7, b=13) -> Decrypted Text: IZLITVITLYLYULGVAAYBTKG  
Key (a=7, b=14) -> Decrypted Text: TKWTEGTEWJWJFWRGLLJMEVR  
Key (a=7, b=15) -> Decrypted Text: EVHEPREPHUHUQHCRWUXPGC  
Key (a=7, b=16) -> Decrypted Text: PGSPACPASFBSNCHHFIARN  
Key (a=7, b=17) -> Decrypted Text: ARDALNALDQDQMDYNSSQTLCY  
Key (a=7, b=18) -> Decrypted Text: LCOLWYLW0B0BX0JYDDBEWNJ  
Key (a=7, b=19) -> Decrypted Text: WNZWHJWHZMZMIZUJJOOMPHYU  
Key (a=7, b=20) -> Decrypted Text: HYKHSUHSKXKXTKFUZZXASJF  
Key (a=7, b=21) -> Decrypted Text: SJVSDFS DVIVIEVQFKKILDUQ  
Key (a=7, b=22) -> Decrypted Text: DUGDOQDQGTGTGPGQVVTW0FB  
Key (a=7, b=23) -> Decrypted Text: OFROZBOZREAREMBGGEHZQM  
Key (a=7, b=24) -> Decrypted Text: ZQCZKMZKPCPLCXMRPSKBX  
Key (a=7, b=25) -> Decrypted Text: KBNKVXKVNANAWNIXCCADVMI  
Key (a=9, b=0) -> Decrypted Text: ZSKZWMZWKXKXRKJMNXIWPJ  
Key (a=9, b=1) -> Decrypted Text: WPHWTJWTHUHU0HGJKKUFTMG  
Key (a=9, b=2) -> Decrypted Text: TMETQGTQERERLEDGHHRCQJD  
Key (a=9, b=3) -> Decrypted Text: QJBQNDQNB0B0IBADEEOZNGA  
Key (a=9, b=4) -> Decrypted Text: NGYNKANKYLYLFYXABBLWKDX  
Key (a=9, b=5) -> Decrypted Text: KDVKHXKHVIVICVUXYYITHAU  
Key (a=9, b=6) -> Decrypted Text: HASHEUHESFSFZSRUVVFQEXR  
Key (a=9, b=7) -> Decrypted Text: EXPEBREBPCPCWPORSSCNBU0  
Key (a=9, b=8) -> Decrypted Text: BUMBYOBYMZMTMLOPPZKYRL  
Key (a=9, b=9) -> Decrypted Text: YRJYVLYVJWJWQJILMMWHVOI  
Key (a=9, b=10) -> Decrypted Text: VOGVSIVSGTGTNGFIJJTESLF  
Key (a=9, b=11) -> Decrypted Text: SLDSPFSPDQDQKDCFGGQBPI0

Key (a=9, b=12) -> Decrypted Text: PIAPMCPMANANHAZCDDNYMFZ  
Key (a=9, b=13) -> Decrypted Text: MFXMJZMJXKKXEXWZAAKVJCW  
Key (a=9, b=14) -> Decrypted Text: JCUJGWJGUHUHBUTWXXHSGZT  
Key (a=9, b=15) -> Decrypted Text: GZRGDTGDREREYRQTUUEPDWQ  
Key (a=9, b=16) -> Decrypted Text: DWODAQDAOBOBVONQRRBMATN  
Key (a=9, b=17) -> Decrypted Text: ATLAXNAXLYLYSLKNOOYJXQK  
Key (a=9, b=18) -> Decrypted Text: XQIXUKXUIVIVPIHKLLVGUNH  
Key (a=9, b=19) -> Decrypted Text: UNFURHURFSFSMFEHIISDRKE  
Key (a=9, b=20) -> Decrypted Text: RKCROEROCPCPJCBEFFPAOHB  
Key (a=9, b=21) -> Decrypted Text: OHZOLBOLZMZMGZYBCCMXLEY  
Key (a=9, b=22) -> Decrypted Text: LEWLIYLIWJWJDWVYZZJUIBV  
Key (a=9, b=23) -> Decrypted Text: IBTIFVIFTGTGATSVWWGRFYS  
Key (a=9, b=24) -> Decrypted Text: FYQFCSFCQDQDXQPSTTD0CVP  
Key (a=9, b=25) -> Decrypted Text: CVNCZPCZNANAUNMPQQALZSM  
Key (a=11, b=0) -> Decrypted Text: LKULSYLSUHUHVUFYNNHQSRF  
Key (a=11, b=1) -> Decrypted Text: SRBSZFSZB0B0CBMFUU0XZYM  
Key (a=11, b=2) -> Decrypted Text: ZYIZGMZGIVIVJITMBBVEGFT  
Key (a=11, b=3) -> Decrypted Text: GFGNTGNPCPCQPATIICLNMA  
Key (a=11, b=4) -> Decrypted Text: NMWNUANUWJWJXWAPPJSUTH  
Key (a=11, b=5) -> Decrypted Text: UTDUBHUBDQDQEDOHWWQZBAO  
Key (a=11, b=6) -> Decrypted Text: BAKBIOBIKXKXLKVODDXGIHV  
Key (a=11, b=7) -> Decrypted Text: IHRIPVIPRERESRCVKKENPOC  
Key (a=11, b=8) -> Decrypted Text: POYPWCPWYLYLZYJCRRLUWVJ  
Key (a=11, b=9) -> Decrypted Text: WFWWDJWDFSFGFQJYYSBDCQ  
Key (a=11, b=10) -> Decrypted Text: DCMDKQDKMZMNMXQFFZIKJX  
Key (a=11, b=11) -> Decrypted Text: KJTKRXKRTGTGUTEXMMGPRQE  
Key (a=11, b=12) -> Decrypted Text: RQARYERYANANBALETTNWWYXL  
Key (a=11, b=13) -> Decrypted Text: YXHYFLYFHUUIHSLAAUDFES  
Key (a=11, b=14) -> Decrypted Text: FE0FMSFM0B0BPOZSHHBKMLZ  
Key (a=11, b=15) -> Decrypted Text: MLVMTZMTVIVIWVGZ00IRTSG  
Key (a=11, b=16) -> Decrypted Text: TSCTAGTACPCPDNGVVPYAZN  
Key (a=11, b=17) -> Decrypted Text: AZJAHNAHJWJWKJUNCCWFHGU  
Key (a=11, b=18) -> Decrypted Text: HGQHOUHOQDQDRQBUJJD0NB  
Key (a=11, b=19) -> Decrypted Text: ONXOVBOVXKKXKXIBQQKTUVI  
Key (a=11, b=20) -> Decrypted Text: VUEVCIVCERERFEPIXXRACBP  
Key (a=11, b=21) -> Decrypted Text: CBLCJPCJLYLYMLWPEEYHJIW  
Key (a=11, b=22) -> Decrypted Text: JISJQWJQSFSFTSDWLLFOQPD  
Key (a=11, b=23) -> Decrypted Text: QPZQXDQXZMZMAZKDSSMVXWK  
Key (a=11, b=24) -> Decrypted Text: XWGXEKXEGTGTHGRKZZTCEDR  
Key (a=11, b=25) -> Decrypted Text: EDNELRELNANAONYRGGAJLKY  
Key (a=15, b=0) -> Decrypted Text: PQGPICPIGTGTGVCNNTKIJV  
Key (a=15, b=1) -> Decrypted Text: IJZIBVIBZMZMYZOVGGMDBCO  
Key (a=15, b=2) -> Decrypted Text: BCSBUOBUSFSFRSHOZZFUVVH  
Key (a=15, b=3) -> Decrypted Text: UVLUNHUNLYLYKLAHSSYPNOA  
Key (a=15, b=4) -> Decrypted Text: NOENGANGERERDETALLRIGHT  
Key (a=15, b=5) -> Decrypted Text: GHXGZTGZXKKXWMTTEEBZAM  
Key (a=15, b=6) -> Decrypted Text: ZAQZSMZSQDQDPQFMXXDUSTF  
Key (a=15, b=7) -> Decrypted Text: STJSLFSLJWJWIJYFQQWNLMY  
Key (a=15, b=8) -> Decrypted Text: LMCLEYLECPCPBCRYJJPGEFR  
Key (a=15, b=9) -> Decrypted Text: EFVEXREXVIVIUVKRCCIZXYK  
Key (a=15, b=10) -> Decrypted Text: XYOXQKXQ0B0BNODKVVBSQRD  
Key (a=15, b=11) -> Decrypted Text: QRHQJDQJHUHUGHWD00ULJKW  
Key (a=15, b=12) -> Decrypted Text: JKAJCWJCANANZAPWHHNECDP  
Key (a=15, b=13) -> Decrypted Text: CDTCVPCVTGTGSTIPAAGXVWI  
Key (a=15, b=14) -> Decrypted Text: VWMVOIVOMZMZLMBITTTZQ0PB  
Key (a=15, b=15) -> Decrypted Text: OPFOHBOHFSFSEFUBMMSJHIU

Key (a=15, b=16) -> Decrypted Text: HIYHAUHAYLYLXYNUFFLCABN  
Key (a=15, b=17) -> Decrypted Text: ABRATNATREREQRGNYYEVTUG  
Key (a=15, b=18) -> Decrypted Text: TUKTMGMTMKXXJKZGRRXOMNZ  
Key (a=15, b=19) -> Decrypted Text: MNDMFZMFDQDQCDZSKKQHFGS  
Key (a=15, b=20) -> Decrypted Text: FGWFYSFYWJWJVWLSDDJAYZL  
Key (a=15, b=21) -> Decrypted Text: YZPYRLYRCPCEPELWWCTRSE  
Key (a=15, b=22) -> Decrypted Text: RSIRKERKIVIVHIXEPPVMKLX  
Key (a=15, b=23) -> Decrypted Text: KLBKDXKDBOBOABQXIIOFDEQ  
Key (a=15, b=24) -> Decrypted Text: DEUDWQDUWUHTUJQBBHYWXJ  
Key (a=15, b=25) -> Decrypted Text: WXNWPJWPANANAMNCJUARPQC  
Key (a=17, b=0) -> Decrypted Text: BIQBEOBEQDQDJQRONNDELRL  
Key (a=17, b=1) -> Decrypted Text: ELTEHREHTGTGMTURQQGVHOU  
Key (a=17, b=2) -> Decrypted Text: HOWHKUHKWJWJPWXUTTJYKRX  
Key (a=17, b=3) -> Decrypted Text: KRZKNXKNZMMSZAXWMBNUA  
Key (a=17, b=4) -> Decrypted Text: NUCNQANQCPCPVCDAZZPEQXD  
Key (a=17, b=5) -> Decrypted Text: QXFQTDQTFSSYFGDCCSHTAG  
Key (a=17, b=6) -> Decrypted Text: TAITWGTWIVIVBIJGFFVKWDJ  
Key (a=17, b=7) -> Decrypted Text: WDLWZJWZLYLYELMJIIYNZGM  
Key (a=17, b=8) -> Decrypted Text: ZGOZCMZCOBOBHOPMLLBQCJP  
Key (a=17, b=9) -> Decrypted Text: CJRCFPCFREREKRSP00ETFMS  
Key (a=17, b=10) -> Decrypted Text: FMUFISFIUHUHNUVSRRHWIPV  
Key (a=17, b=11) -> Decrypted Text: IPXILVILXKKXQXYVUUKZLSY  
Key (a=17, b=12) -> Decrypted Text: LSALOYLOANANTABYXXNCOVB  
Key (a=17, b=13) -> Decrypted Text: OVDORBORDQDQWDEBAAQFRYE  
Key (a=17, b=14) -> Decrypted Text: RYGRUERUGTGTZGHEDDTIUBH  
Key (a=17, b=15) -> Decrypted Text: UBJUXHUXJWJWCJKHGGWLXEK  
Key (a=17, b=16) -> Decrypted Text: XEMXAKXAMZMFMNKJJZOAHN  
Key (a=17, b=17) -> Decrypted Text: AHPADNADPCPCIPQNMCCRDKQ  
Key (a=17, b=18) -> Decrypted Text: DKSDGQDGSFSLSTQPPFUGNT  
Key (a=17, b=19) -> Decrypted Text: GNVGJTGJVIVIOVWTSSIXJQW  
Key (a=17, b=20) -> Decrypted Text: JQYJMWJMYLYLRYZWVVLAMTZ  
Key (a=17, b=21) -> Decrypted Text: MTBMPZMPBOBOUBCZYYODPWC  
Key (a=17, b=22) -> Decrypted Text: PWEPCSPSERERXEFBBRGSZF  
Key (a=17, b=23) -> Decrypted Text: SZHSVFSVHUUAHIFEEUJVCII  
Key (a=17, b=24) -> Decrypted Text: VCKVYIVYKXKXDKLIHHXMYFL  
Key (a=17, b=25) -> Decrypted Text: YFNYBLYBNANAGNOLKKAPBIO  
Key (a=19, b=0) -> Decrypted Text: FOCFUSFUCPCPTCHSNPMUDH  
Key (a=19, b=1) -> Decrypted Text: UDRUJHUJREREIRWHCCEBJSW  
Key (a=19, b=2) -> Decrypted Text: JSGJYWJYGTGTXLWRRTQYHL  
Key (a=19, b=3) -> Decrypted Text: YHVYNLYNVIVIMVALGGIFNWA  
Key (a=19, b=4) -> Decrypted Text: NWKNCANCKXKBKPAVVXUCLP  
Key (a=19, b=5) -> Decrypted Text: CLZCRPCRZMZMQZEPKMKJRAE  
Key (a=19, b=6) -> Decrypted Text: RAORGERGOBOBFOTEZZBYGPT  
Key (a=19, b=7) -> Decrypted Text: GPDGVTGVDQDQUDITOOQNVEI  
Key (a=19, b=8) -> Decrypted Text: VESVKIVKSFSFJSXIDDFCKTX  
Key (a=19, b=9) -> Decrypted Text: KTHKZXKZHUHUYHMXSSURZIM  
Key (a=19, b=10) -> Decrypted Text: ZIWZOMZOWJWJNWBMMHJGOXB  
Key (a=19, b=11) -> Decrypted Text: OXL0DBODLYLYCLQBWWYVDMQ  
Key (a=19, b=12) -> Decrypted Text: DMADSQDSANANRAFQLLNKSBF  
Key (a=19, b=13) -> Decrypted Text: SBPSHFSPHPCGPFUFAACZHQU  
Key (a=19, b=14) -> Decrypted Text: HQEHUHWERERVEJUPPROWFJ  
Key (a=19, b=15) -> Decrypted Text: WFTWLJWLTGTGKTYJEEGLUY  
Key (a=19, b=16) -> Decrypted Text: LUILAYLAIVIVZINYYTTVSAJN  
Key (a=19, b=17) -> Decrypted Text: AJXAPNAPXKXKXCNIIKHPYC  
Key (a=19, b=18) -> Decrypted Text: PYMPECEPMZMZDMRCXXZWENR  
Key (a=19, b=19) -> Decrypted Text: ENBETRETB0B0SBGRMMOLTCG



Key (a=19, b=20) -> Decrypted Text: TCQTIGTIQDQDHQVGBBDAIRV  
Key (a=19, b=21) -> Decrypted Text: IRFIXVIXFSFSWFKVQQSPXGK  
Key (a=19, b=22) -> Decrypted Text: XGUXMKXMUHUUHLUZKFFHEMVZ  
Key (a=19, b=23) -> Decrypted Text: MVJMBZMBJWJWAJOZUUWTBKO  
Key (a=19, b=24) -> Decrypted Text: BKYBQOBQYLYLPYDOJJLIQZD  
Key (a=19, b=25) -> Decrypted Text: QZNQFDQFNANAENSYYAXFOS  
Key (a=21, b=0) -> Decrypted Text: HEIHCUHCIVIVLIPUNNVWCZP  
Key (a=21, b=1) -> Decrypted Text: CZDCXPCXDQDQGDKPIIQRXUK  
Key (a=21, b=2) -> Decrypted Text: XUYXSKXSYLELBYFKDDLMSPF  
Key (a=21, b=3) -> Decrypted Text: SPTS NFSNTGTGWTAFYYGHNKA  
Key (a=21, b=4) -> Decrypted Text: NKONIANIOBOBROVATTBCIFV  
Key (a=21, b=5) -> Decrypted Text: IFJIDVIDJWJWMJQV00WXDAQ  
Key (a=21, b=6) -> Decrypted Text: DAEDYQDYERERHELQJJRSYVL  
Key (a=21, b=7) -> Decrypted Text: YVZYTLYTZMZMCZGLEEMNTQG  
Key (a=21, b=8) -> Decrypted Text: TQUTOGTOUHUHUXUBGZZHIOLB  
Key (a=21, b=9) -> Decrypted Text: OLPOJBOJPCPCSPWBUUCDJGW  
Key (a=21, b=10) -> Decrypted Text: JGKJEWJEKXXKNRWPPXYEBR  
Key (a=21, b=11) -> Decrypted Text: EBFEREZFSFSIFMRKKSTZWM  
Key (a=21, b=12) -> Decrypted Text: ZWAZUMZUANANDAHMFFNOURH  
Key (a=21, b=13) -> Decrypted Text: URVUPHUPVIVIIYVCHAAIJPMC  
Key (a=21, b=14) -> Decrypted Text: PMQPKCPKQDQDTQXCVVDEKHX  
Key (a=21, b=15) -> Decrypted Text: KHLKFXXFLYLYOLSXQQYZFCS  
Key (a=21, b=16) -> Decrypted Text: FCGFASFAGTGTJGNSLLTUAXN  
Key (a=21, b=17) -> Decrypted Text: AXBAVNAVBOBOEBINGGOPVSI  
Key (a=21, b=18) -> Decrypted Text: VSWVQIVQWJWJZWDIBBJKQND  
Key (a=21, b=19) -> Decrypted Text: QNRQLDQLREREURYDWEFLIY  
Key (a=21, b=20) -> Decrypted Text: LIMLGYLGMZMPMTYRRZAGDT  
Key (a=21, b=21) -> Decrypted Text: GDHGBTGBHUHUKHOTMMUVBYO  
Key (a=21, b=22) -> Decrypted Text: BYCBWOBWCPFCFCJOHHPQWTJ  
Key (a=21, b=23) -> Decrypted Text: WTXWRJWRXKKXAXEJCCKLROE  
Key (a=21, b=24) -> Decrypted Text: ROSRMERMSFSFVSZEXXFGMJZ  
Key (a=21, b=25) -> Decrypted Text: MJNMHMHNANAQNUZSSABHEU  
Key (a=23, b=0) -> Decrypted Text: DYWDMQDMWJWJBWZQNNJCMHZ  
Key (a=23, b=1) -> Decrypted Text: MHFMVZMVFSFSKFIZWWSLVQI  
Key (a=23, b=2) -> Decrypted Text: VQOVEIVEOBOBTORIFFBUEZR  
Key (a=23, b=3) -> Decrypted Text: EZXENRENXXKXCXAROOKDNIA  
Key (a=23, b=4) -> Decrypted Text: NIGNWANWGTGTGJAXXTMWRJ  
Key (a=23, b=5) -> Decrypted Text: WRPWFJWFPCPCUPSJGGCVFAS  
Key (a=23, b=6) -> Decrypted Text: FAYFOSFOYLYLDYBSPPLEOJB  
Key (a=23, b=7) -> Decrypted Text: OJHOXBOXHUHUMHKBYUNXSK  
Key (a=23, b=8) -> Decrypted Text: XSQXGKXGQDQDQTKHHDWGBT  
Key (a=23, b=9) -> Decrypted Text: GBZGPTGPMZMEZCTQQMFPKC  
Key (a=23, b=10) -> Decrypted Text: PKIPYCPYIVIVNILCZZVOYTL  
Key (a=23, b=11) -> Decrypted Text: YTRYHLYHREREWULIIEHXCU  
Key (a=23, b=12) -> Decrypted Text: HCAHQUHQANANFADURRNGQLD  
Key (a=23, b=13) -> Decrypted Text: QLJQZDQZJWJWJMDAAWPZUM  
Key (a=23, b=14) -> Decrypted Text: ZUSZIMZISFSFXSVMJJFYIDV  
Key (a=23, b=15) -> Decrypted Text: IDBIRVIRBOBOGBEVSSOHRME  
Key (a=23, b=16) -> Decrypted Text: RMKRAERAKXXPKNEBBXQAVN  
Key (a=23, b=17) -> Decrypted Text: AVTAJNAJTGTYWNKKGZJEW  
Key (a=23, b=18) -> Decrypted Text: JECJSWJSCPCPHCFWTTPI SNF  
Key (a=23, b=19) -> Decrypted Text: SNLSBFSBLYLYQLOFCCYRBWO  
Key (a=23, b=20) -> Decrypted Text: BWUBKOBKUHUHUXOLLHAKFX  
Key (a=23, b=21) -> Decrypted Text: KFDKTXKTDQDQIDGXUUQJTOG  
Key (a=23, b=22) -> Decrypted Text: TOMTCGTCMZMRMPGDDZSCXP  
Key (a=23, b=23) -> Decrypted Text: CXVCLPCLVIVIAVYPMMIBLGY

Key (a=23, b=24) -> Decrypted Text: LGELUYLUERERJEHYVVRKUPH  
 Key (a=23, b=25) -> Decrypted Text: UPNUDHU DNANASNQHEEATDYQ  
 Key (a=25, b=0) -> Decrypted Text: JUOJKWJKOBODOXWNNBGKVX  
 Key (a=25, b=1) -> Decrypted Text: KVPKLXLPCPEPYX00CHLWY  
 Key (a=25, b=2) -> Decrypted Text: LWQLMYLMQDQDFQZYPPDIMXZ  
 Key (a=25, b=3) -> Decrypted Text: MXRMNZMNREREGRAZQQEJNYA  
 Key (a=25, b=4) -> Decrypted Text: NYSNOANOSFSFHSBARRFKOZB  
 Key (a=25, b=5) -> Decrypted Text: OZTOPBOPTGTGITCBSSGLPAC  
 Key (a=25, b=6) -> Decrypted Text: PAUPQCPQUHUHJUDCTTHMQBD  
 Key (a=25, b=7) -> Decrypted Text: QBVQRDQRVIVIKVEDUUIINRCE  
 Key (a=25, b=8) -> Decrypted Text: RCWRSERSWJWJLWFEVVJOSDF  
 Key (a=25, b=9) -> Decrypted Text: SDXSTFSTXKXKMXGFWWKPTG  
 Key (a=25, b=10) -> Decrypted Text: TEYTUGTUUYLYLNYHGXXLQUFH  
 Key (a=25, b=11) -> Decrypted Text: UFZUVHUVZMZOZIHYYMRVGI  
 Key (a=25, b=12) -> Decrypted Text: VGAVWIVWANANPAJIZZNSWHJ  
 Key (a=25, b=13) -> Decrypted Text: WHBWXJWXB0B0QBKJAAOTXIK  
 Key (a=25, b=14) -> Decrypted Text: XICXYKXYCPCPRCLKBBPUYJL  
 Key (a=25, b=15) -> Decrypted Text: YJDYZLYZDQDQSDMLCCQVZKM  
 Key (a=25, b=16) -> Decrypted Text: ZKEZAMZAERERTENMDDR WALN  
 Key (a=25, b=17) -> Decrypted Text: ALFABNABFSFSUFONEESXBMO  
 Key (a=25, b=18) -> Decrypted Text: BMGBCOBCGTGTGPOFFTYCNP  
 Key (a=25, b=19) -> Decrypted Text: CNHCDCDHUHUHQPGGUZDOQ  
 Key (a=25, b=20) -> Decrypted Text: DOIDEQDEIVIVXIRQHHVAEPR  
 Key (a=25, b=21) -> Decrypted Text: EPJEFREFJWJWYJSRIIWB FQS  
 Key (a=25, b=22) -> Decrypted Text: FQKFGSFGKXKXZKTSJJXCGRT  
 Key (a=25, b=23) -> Decrypted Text: GRLGHTGHLYLYALUTKKYDHSU  
 Key (a=25, b=24) -> Decrypted Text: HSMHIUHIMZMZBMVULLZEITV  
 Key (a=25, b=25) -> Decrypted Text: ITNIJVIJNANACNWMMAFJUW

Instead of reading through all of these decrypted blocks of text manually, this task is delegated to our Robot Overlords, represented by Chat GPT, to identify any sensible combinations of letters, often referred to as a proper sentence or word.

The response:

It looks like the decrypted text is **"NOENGANGERERDETALLRIGHT"** with key  $a = 15$  and  $b = 4$ , which translates to "NO EN GANG ER DET ALL RIGHT" in Norwegian, meaning "Not even once is it all right."

So, the plaintext was successfully decrypted using the affine cipher with the key ( $a = 15, b = 4$ ).

One notes that the LLM does not properly separate the words into a sensible Norwegian sentence, thus making the claim of robot overlord somewhat hyperbolic as of yet, but from what the chatbot found a human would easily see that the deciphered message should be the following:

NOEN GANGER ER DET ALL RIGHT

The message is encrypted using the keys ( $a = 15, b = 4$ )

## Problem 05

Using frequency analysis on the cipher text from decode.fr:

Each character separately:



Letter	Occurences	Occurence %	
D	85×	18.28%	
I	54×	11.61%	
B	38×	8.17%	
K	33×	7.1%	
C	32×	6.88%	
V	26×	5.59%	
O	24×	5.16%	
Q	23×	4.95%	
W	22×	4.73%	
T	19×	4.09%	
S	13×	2.8%	
A	13×	2.8%	
E	10×	2.15%	
H	10×	2.15%	
Y	9×	1.94%	
P	8×	1.72%	
U	7×	1.51%	
M	7×	1.51%	
F	6×	1.29%	
R	6×	1.29%	
G	6×	1.29%	
J	6×	1.29%	
X	3×	0.65%	
L	3×	0.65%	
N	1×	0.22%	
Z	1×	0.22%	
#N : 26	$\Sigma = 465.00$	$\Sigma = 100.04$	#N : 26

Bigrams (couples of 2 characters), leaving out anything below 0,86% for brevity:

Letter	Occurences	Occurence %	
ID	9×	3.88%	
VD	7×	3.02%	
TI	7×	3.02%	
BD	6×	2.59%	
YD	6×	2.59%	
DC	6×	2.59%	
QB	5×	2.16%	
QV	5×	2.16%	
DT	5×	2.16%	
KO	4×	1.72%	
IW	4×	1.72%	
HW	4×	1.72%	
BE	4×	1.72%	
KB	4×	1.72%	
IG	4×	1.72%	
BI	4×	1.72%	
DO	4×	1.72%	
BC	3×	1.29%	
DM	3×	1.29%	
AD	3×	1.29%	
DQ	3×	1.29%	
OK	3×	1.29%	
BA	3×	1.29%	
DB	3×	1.29%	
CD	3×	1.29%	
CU	3×	1.29%	
IB	2×	0.86%	
DI	2×	0.86%	
KV	2×	0.86%	
#N : 122	$\Sigma = 232.00$	$\Sigma = 99.850$	#N : 122

Trigrams (set of 3 characters), where all combinations below 1,29% were evaluated to 0,65%.

Letter	Occurences	Occurence %	
QVD	3×	1.94%	
TID	3×	1.94%	
WIX	2×	1.29%	
SIB	2×	1.29%	
DKB	2×	1.29%	
BDH	2×	1.29%	
OKB	2×	1.29%	
ASK	2×	1.29%	
AID	2×	1.29%	
DIG	2×	1.29%	
VIB	2×	1.29%	
IBE	2×	1.29%	
UCB	1×	0.65%	
CKO	1×	0.65%	
#N : 141	$\Sigma = 155.00$	$\Sigma = 100.63$	#N : 141

N=4 grams

↑↓	↑↓	↑↓	↑↓
DMWC	2×	1.72%	
IXSI	2×	1.72%	
HWCU	2×	1.72%	
OKBA	2×	1.72%	
SKAI	2×	1.72%	
DTID	2×	1.72%	
UCBC	1×	0.86%	

Based on the frequency analysis of the ciphertext, the top 10 letters and their counts are:

D: 85 occurrences  
 I: 54 occurrences  
 B: 38 occurrences  
 K: 33 occurrences  
 C: 32 occurrences  
 V: 26 occurrences  
 O: 24 occurrences  
 Q: 23 occurrences  
 W: 22 occurrences  
 T: 19 occurrences

According to [Wikipedia](#), the most frequent letters in English are typically **E, T, A, O** and **I**.

Letter	Relative frequency in the English language <sup>[1]</sup>	
	In texts	In dictionaries <sup>[citation needed]</sup>
<b>E</b>	12.7%	11.0%
<b>T</b>	9.1%	6.7%
<b>A</b>	8.2%	7.8%
<b>O</b>	7.5%	6.1%
<b>I</b>	7.0%	8.6%
<b>N</b>	6.7%	7.2%
<b>S</b>	6.3%	8.7%
<b>H</b>	6.1%	2.3%
<b>R</b>	6.0%	7.3%
<b>D</b>	4.3%	3.8%

If extending this list to 10 letters (**E, T, A, O, I, N, S, H, R** and **D**) to match the list above, it is possible to make an initial assumption as follows:

- **D** could correspond to **E**, which is the most frequent letter in English.
- Alternatively, **D** could correspond to **space**, since this too is a very common character in text.
- **I** could correspond to **T**.
- **B** might correspond to **A**. **a** is an Article, thus often used on its own, not only as part of a word.
- **K** could correspond to **O**.
- **C** could correspond to **I**. **I** used as a pronoun often appears on its own, not only as part of a word.
- **V** could correspond to **N**
- **O** could correspond to **S**
- **Q** could correspond to **H**
- **W** could correspond to **R**
- **T** could correspond to **D**

Table listing cipher and english letter frequency in a descending order:

Cipher letter frequency, descending	English text letter frequency, descending	With space
D	E	space
I	T	E
B	A	T
K	O	A
C	I	O
V	N	I
O	S	N
Q	H	S
W	R	H
T	D	R
		D

For bigrams:

Cipher bigram frequency, descending	English text bigram frequency, descending
ID	be
VD	to
TI	of
BD	in

For trigrams:

Cipher trigram frequency, descending	English text trigram frequency, descending
QVD	the
TID	and
WIX	for
SIB	not

For  $n$ -grams,  $n = 4$ :

Cipher $n=4$ -gram frequency, descending	English text $n=4$ -gram frequency, descending
DMWC	that
IXSI	have

Cipher n=4-gram frequency, descending	English text n=4-gram frequency, descending
HWCU	with
OKBA	this

These makes for a starting point, from which to try substituting letters and sequences in the ciphertext, looking for patterns. By using the frequency analysis and doing substitution by trial and error, the following text was decrypted:

```

MONOALPHABETIC SUBSTITUTION CAN IN GENERAL EASILY BE BROKEN USING FREQUENCY ANALYSIS

THIS ONLY WORKS WELL IF THE PLAIN TEXT IS LONG ENOUGH AND IS NOT TOO DIFFERENT FROM NORMAL
TEXT

ONE SHOULD ALSO KNOW WHAT LANGUAGE THE PLAIN TEXT IS WRITTEN IN, AS THE FREQUENCIES OF
LETTERS VARY FROM LANGUAGE TO LANGUAGE

SOME TEXTS ARE HARDER TO BREAK THAN OTHERS

AN EXAMPLE IS THE SENTENCE THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
THIS SENTENCE CONTAINS EVERY LETTER OF THE ALPHABET, HELPING THE CRYPTANALYSIS

GOOD LUCK

```

## Online Substituion Solver tool

Using an online subsitution solver service (<https://www.guballa.de/substitution-solver>), I was able to check the decrypted message. This substitution tool uses a Python program found here: <https://gitlab.com/guballa/SubstitutionBreaker>

Result from running the povided ciphertext in the substitution tool:

```

MONOALPHABE ICTSUBS I U
IONTCANTINTGENERALTEASILYTBETBROKENTUSINGTFREQUENCYTANALYSIST
HISTONLYTWORKSTWELLTI FT HETPLAIN EX TISTLONGTENOUGH TANDTISTNO T
OOTDIFFEREN TFROMTNORMALT EX TONETSHOULDTALSOTKNOWTWHAT LANGUAGE T HETPLAIN
EX TISTWRI ENTINTAST HETFREQUENCIESTOFTLE ERSTVARYTFROMTLANGUAGET
OTLANGUAGETSOMET EX STARETHARDERT OTBREAKT HANTO HERSTANTEXAMPLETIST
HETSEN ENCET HETQUICKTBROWNTFOX TJUMPSTOVERT HETLAZYTDOGT HISTSEN
ENCETCON AINSTEVEERYTLE ERTOFT HETALPHABE TNO THELPINGT HETCRYP
ANALYS TGOODTLUCK

```

This text obviously need some clean-up to be readable, but it's clear that there's proper english words there.

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GOOD LUCK

When going through the text, it becomes clear that `T` takes the place of `space`, which leaves all places where a `T` should occur in words empty. To make it easier to read, these places were populated with underscore `_`.

The scrubbed text:

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GOOD LUCK