Riemann Zeta Function Encryption

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Abstract

The purpose of this papers is to share an encryption system based on a modified Riemann Zeta function which relates to prime numbers.

I. Introduction

I want to first introduce the modified Riemann Zeta Function that relates to prime numbers. In the equation below, it is a form of Riemann Zeta Function and it shows an approximate relationship between the Riemann Zeta Function and Prime Numbers.

Riemann Zeta Function Modified Equation

$$\zeta(s)=1/(((1/(2))/\log(2)))+ 1/(((1/(3))/\log(3)))+ 1/(((1/(4))/\log(4)))+1/(((1/(5))/\log(5)))$$

Relationship between (S) & Prime Number

S=2

```
s=1/(((1/(S))/math.log(S)))
```

print (s) 1.3862943611198906 **Actual prime 2**

S=3

```
s=1/(((1/(S))/math.log(S)))
```

print (s) 3.2958368660043296 **Actual prime 3**

S=4

```
s=1/((1/((S))/math.log(S)))
```

print (s) 5.545177444479562 **Actual prime 5**

S=5

```
s=1/((1/((S))/math.log(S)))
```

print (s) 8.0471895621705 **Actual prime7**

II. Riemann Zeta Function Encryption

In the Riemann Zeta Function Encryption a text message is input into the encryption algorithm and it is converted into a number which is (a). (N) is a randomly generated number >617 digits. The numerical message which is (a) is multiplied by a large number > 617 digits that is randomly produced, this number will be called (S) or the Encrypted Message. The Encrypted Message (S) is inputted in the modified Riemann Zeta Function and the output is the near prime string of numbers, this is called (s) or the Private Encrypted Message Key.

S=((S)Encrypted Message =(a)text message converted to number *(N) large random number 617 digits)

```
s=1/(((1/(S))/math.log(S)))
```

print (s)=Private Encrypted Message Key

III. The Riemann Zeta Function Encryption Program in Python

```
import sys
from random import randint
from functools import reduce
from sys import getsizeof
from mpmath import mp
mp.dps = 2500
print('_____')
a=input('Enter Message:')
def text2Int( text ):
   text=a
   #print(text)
   return reduce(lambda x, y : (x << 8) + y, map(ord, text));
#print (text2Int(text='My String'))
print('_____')
print('Generate Encrypted Message & Encrypted Private Keys')
print('_____')
N=(randint(10**617,10**618))
O=(text2Int(text='My String'))
print('Private Random Number Key:',N)
S=(mp.mpf(N)*mp.mpf(O))
s=(1/(((1/mp.mpf(S))/mp.log(S))))
print('Encrypted Message:',S)
print ('Private Encrypted Message Key:',s)
print('_____')
print('Send')
print('_____')
print('Receive & Enter Message & Encrypted Keys')
t=mp.mpf(input('Enter Private Random Number Key:'))
u=mp.mpf(input('Enter Encrypted Message:'))
v=mp.mpf(input('Enter Private Encrypted Message Key:'))
S=mp.mpf(u)
q=mp.mpf(t)
r=(mp.mpf(S)/mp.mpf(q))
print('_____')
def int2Text(number, size):
   number=int(r)
   size = getsizeof(number)
   text = "".join([chr((number >> j) & 0xff)
                   for j in reversed(range(0, size << 3, 8))])
   return text.lstrip("\x00");
print(int2Text(number='My string', size='My string'))
print('_____')
```

III. The Riemann Zeta Function Encryption Program in Console

runfile('C:/Users/Desktop/Ricardo/Riemann Zeta Function Encryption.py', wdir='C:/Users/Desktop/Ricardo')

Enter Message: Ricardo Gil

Generate Encrypted Message & Encrypted Private Keys

Private Random Number Key:

3670345002584978461652950695988245423073594469968556982932069420876193630283235989748210905967258031036469115868103399472980550871630589689119044016846947506261202957897286485359327395823826267570595253349349148245741066690134540108649601122737272297016418026416159860240035081874026255707755611381687377938725465989934806357271770686198718915405541095250528739886038280231413055458659219639645123067535958920971174043330945798484046423833177700940463153563141212499560882598378500736535316784360110527743758115589335852413653707886722400489792094398340780336690355187113861441201007656211196500510456983737359797080 1

Encrypted Message:

3656750005736504641666453370181448358532012304362715212516427111419430169669967175877679179562695993688119250880173648788632647536942182962684918274652662662492904402369822523296863004208923551954983261491306582265337824607538736524578406123484657648289928527719911127638913115195357739845294537493077119028402869850607486641702190129682314572734780507932251482084729053585126942332495345373767614756364880624956484809465902766874314072908971307272759521089129679079523633200279646217704445757333267849933293322084982590433562691027529546542193592111387599469194367413135019716114426446231032747347305373276421718118695677820299651423783814468 4.0

Private Encrypted Message Key:

5418787137266364524696738638964193218000732561247683331722579955782850871144014371265318936152277283335972107314877381817436463973767809373382929084942759861375425000559586223767903636599937282785723675760672576774833824430131167371268101456554190311291029151239617370208403366458410426848959664947142879022993902472633725871801561925449770696901702801378851231215861482512314972839195585729531416539354520141016387519281691162882442424836749769250081289166645386380796226614622303236983030483121305404962157881352281460839112328520003160274351081510587043054662552526691996431774719801571779900958423922599529825091889764929212099983606928250316 3.19611899482181481928322501960752028824986388936211714843476708962286312640598561060905865255256743139141438803253849151811474286404899354484475491385703701926509578852909919163073478535715823808075762084225568288866144433473543787730236537333412250097623038358510303350242834768274555521407373001049494998302091618856441874592682894030192774383915092083461220216559512011161415788325458129754081165770481018072965301670468889583743875904130857102852653034071147094920776500641672287514478940983564609682007531241672121077455848168565910957363378266591118416728517387665107391660853109120439872630249831771236841746303613485134044094742437606613898733355885108601873742046359318270467113378336689177422039453659539260223923887513852302738353540864895522633376639186677005906016999662838808058223598548547161116981622142325637425750083183347458949613929363195831617835618164369446854513443410269691296628114356739702922941078798427009622451553663921212620679677092178269706897524297488759421022086054957300090453468378413532232566790140071216828320875405827761407647971969643832925388033622133637525347705947177713310979930313859414669720486874667359675762541890371892887629822818320359028476017728064564881589414008529599237888286297642849802853231400202655158615895569122740919864231539680547208441803097443807047051543320533273139030509219618154738951915651064858293406975679479381844950900074946758575506081046027522865108422437792228090577202368263499890105448091171800488442009804318594540570071052250042093310098008795246185979286811010529065199930279015949405973014979322047053061461228402441244095929523569732797445142833152327559365656034981964675820696642201509482044032691328677803973006373834986708459939001331682181623446615318674507645491790700398635074479797849093580605687100664356041518477255273551160049792698874201234592400053678181 59

Send

Receive & Enter Message & Encrypted Keys

Enter Private Random Number Key:

3670345002584978461652950695988245423073594469968556982932069420876193630283235989748210905967258031036469115868103399472980550871630589689119044016846947506261202957897286485359327395823826267570595253349349148245741066690134540108649601122737272297016418026416159860240035081874026255707755611381687377938725465989934806357271770686198718915405541095250528739886038280231413055458659219639645123067535958920971174043330945798484046423833177700940463153563141212499560882598378500736535316784360110527743758115589335852413653707886722400489792094398340780336690355187113861441201007656211196500510456983737359797080 1

Enter Encrypted Message:

3656750005736504641666453370181448358532012304362715212516427111419430169669967175877679179562695993688119250880173648788632647536942182962684918274652662662492904402369822523296863004208923551954983261491306582265337824607538736524578406123484657648289928527719911127638913115195357739845294537493077119028402869850607486641702190129682314572734780507932251482084729053585126942332495345373767614756364880624956484809465902766874314072908971307272759521089129679079523633200279646217704445757333267849933293322084982590433562691027529546542193592111387599469194367413135019716114426446231032747347305373276421718118695677820299651423783814468 4.0

Enter Private Encrypted Message Key:

**5418787137266364524696738638964193218000732561247683331722579955782850871144014371265318936152277283335972107314877381817436463973767
8093733829290849427598613754250005595862237679036365999372827857236757606725767748338244301311673712681014565541903112910291512396173
7020840336645841042684895966494714287902299390247263372587180156192544977069690170280137885123121586148251231497283919558572953141653
9354520141016387519281691162882442424836749769250081289166645386380796226614622303236983030483121305404962157881352281460839112328520
0031602743510815105870430546625525266919964317747198015717799009584239225995298250918897649292120999836069282503163.19611899482181481
9283225019607520882498638893621171484347670896228631264059856106090586525525674313914143880325384915181147428640489935448447549138570
0370192650957885290991916307347853571582380807576208422556828886614443347354378773023653733341225009762303835851030335024283476827455
5521407373001049494998302091618856441874592682894030192774383915092083461220216559512011161415788325458129754081165770481018072965301
6704688895837438759041308571028526530340711470949207765006416722875144789409835646096820075312416721210774558481685659109573633782659
1118416728517387665107391660853109120439872630249831771236841746303613485134044094742437606613898733355885108601873742046359318270467
1133783366891774220394536595392602239238875138523027383535408648955226333766391866770059060169996628388080582235985485471611169816221
4232563742575008318334745894961392936319583161783561816436944685451344434102696912966281143567397029229410787984270096224515536639212
1262067967709217826970689752429748875942102208605495730009045346837841353223256679014007121682832087540582776140764797196964383292538
8033622133637525347705947177713310979930313859414669720486874667359675762541890371892887629822818320359028476017728064564881589414008
5295992378882862976428498028532314002026551586158955691227409198642315396805472084418030974438070470515433205332731390305092196181547
3895191565106485829340697567947938184495090007494675857550608104602752286510842243779222809057720236826349989010544809117180048844200
9804318594540570071052250042093310098008795246185979286811010529065199930279015949405973014979322047053061461228402441244095929523356
9732797445142833152327559365656034981964675820696642201509482044032691328677803973006373834986708459939001331682181623446615318674507
6454917907003986350744797978490935806056871006643560415184772552735511600497926988742012345924000536781815 9

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IV. References

1). Gil, R. (2016). Riemann Zeta Function and Relationship to Prime Numbers. viXra:1610.0083 [v-1], 1).