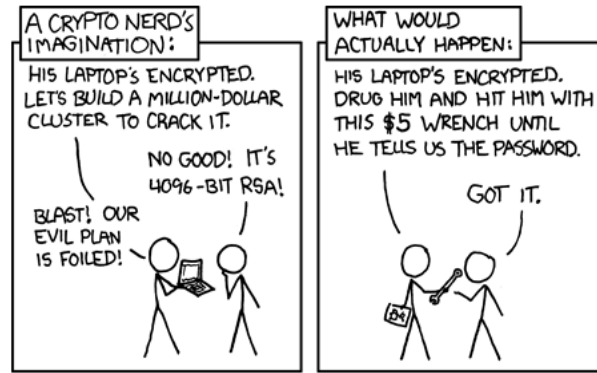


Anomaly's SSSS 2019 Codebusters Test



<https://xkcd.com/538/>

Competitors Names:

Notes:

In this test packet, you'll find two tests. The first is a test of just regional level ciphers, as mentioned in the rules for the 2018-2019 season. There is also a supplement test, with one question of each type of state/national level cipher as outlined in those same rules.

Test 1

Question	Value	Incorrect letters	Deduction	Score
Timed	300			
1	200			
2	225			
3	120			
4	250			
5	100			
6	275			
7	400			
8	300			
9	500			
10	100			
11	115			
12	550			
13	150			
14	575			
15	300			
16	350			
17	200			
Bonus				
Final Score				

Test 2

Question	Value	Incorrect letters	Deduction	Score
1	215			
2	250			
3	175			
4	275			
5	215			
6	200			
7	100			
8	265			
9	305			
10	300			
11	120			
12	650			
Final Score				

The following tables might be useful during the event.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A

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

AAAAA	A	AABBA	G	ABBAA	N	BAABA	T
AAAAB	B	AABBB	H	ABBAB	O	BAABB	U/V
AAABA	C	ABAAA	I/J	ABBBA	P	BABAA	W
AAABB	D	ABAAB	K	ABBBB	Q	BABAB	X
AABAA	E	ABABA	L	BAAAA	R	BABBA	Y
AABAB	F	ABABB	M	BAAAB	S	BABBB	Z

Frequency Table of English letters:

E - 12.51%	S - 6.54%	C - 3.06%	G - 1.96%	K - 0.67%
T - 9.25%	R - 6.12%	U - 2.71%	W - 1.92%	X - 0.19%
A - 8.04%	H - 5.49%	M - 2.53%	Y - 1.73%	J - 0.16%
O - 7.60%	L - 4.14%	F - 2.30%	B - 1.54%	Q - 0.11%
I - 7.26%	D - 3.99%	P - 2.00%	V - 0.99%	Z - 0.09%
N - 7.09%				

Frequency Table of Spanish letters:

E - 14.08%	I - 5.98%	M - 3.08%	Y - 1.09%	Z - 0.47%
A - 12.16%	L - 5.24%	P - 2.89%	V - 1.05%	Ñ - 0.17%
O - 9.20%	D - 4.67%	B - 1.49%	G - 1.00%	X - 0.14%
S - 7.20%	T - 4.60%	H - 1.18%	F - 0.69%	K - 0.11%
N - 6.83%	U - 4.69%	Q - 1.11%	J - 0.52%	W - 0.04%
R - 6.41%	C - 3.87%			

For the purposes of cryptograms it is customary to treat n and ñ as distinct letters, but a and á are the same letter. Likewise for e and é, and i and í. In other words, all the accent marks get amputated when working with cryptograms. Also, while some older Spanish dictionaries consider ch, ll, and rr, to be their own letters—this has fallen out of modern usage. Accordingly, “burro” is considered as five letters: “b-u-r-r-o” and not as four letters “b-u-rr-o.”

Timed Question [300 points] Solve this quote from the 1994 movie *Forrest Gump*, which has since been slightly modified into a common saying. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

UM UAUUL LCBLMH HLQS, "CQVJ BLH CQEJ L PAR AV

ITAIACLDJH. MAK YJXJW EYAB BTLD MAK'WJ OAYYL OJD."

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	9	4	4	3	2			4	2	7	2	9	4		2	1	3	1	1	2	4	2	2	1	4	
Replacement																										

1) [200 points] Solve this aristocrat, which is the famous last line from F. Scott Fitzgerald's *The Great Gatsby*

NW ER MRUG WK, MWUGN ULUPKNG GFR DZTTRKG, MWTKR MUDQ

DRUNRJRNNJI PKGW GFR AUNG.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	1			3	1	2	8		1	2	5	1	4	7		2	1	9		3	7		5			1
Replacement																										

2) [225 points] Solve this saying by Benjamin Franklin, published in his renowned *Poor Richard's Almanac*

TU MZO NKKNTEL PK MZTL SPEIY, DOU NEO LNROY, UPM HX

KNTMZ, HBM HX MZO INAG PK TM.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	1	1		1	3		1	3	2		5	3	7	6	5	4		1	1	5	3			2	2	4
Replacement																										

5) [100 points] Decode this Atbash, which is a quote by chemist Dmitri Mendeleev

K	O	V	Z	H	F	I	V	H	U	O	R	G	Y	B	-	G	S	V	B	Z	I	V	L	M	O	B	U	L	I	
															-															
B	L	F	I	H	V	O	U	;	D	L	I	P	O	V	Z	E	V	H	Z	N	Z	I	P	L	U	O	L	M	T	-
								;																						-
O	Z	H	G	R	M	T	Q	L	B	,	D	L	I	P	R	H	U	L	I	L	G	S	V	I	H	.				
										,																.				

6) [275 points] Encode this vigenere, a quote by Carl Sagan, using a keyword of **creativity**

I	M	A	G	I	N	A	T	I	O	N	W	I	L	L	O	F	T	E	N	C	A	R	R	Y	U	S	T	O	W	O	R	L	D	S
T	H	A	T	N	E	V	E	R	W	E	R	E	B	U	T	W	I	T	H	O	U	T	I	T	W	E	G	O	N	O	W	H	E	R

E

9) [500 points] Solve this patristocrat, a quote from the movie *Jaws*. It has the word "beach" in it.

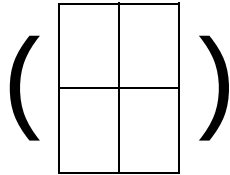
KTKFF OLVFN MFCXT FGVXG UVIVF MFFMA WVYRJ TNMOW

TKBFN OVVSF VFXSQ MFVOM RXLFF VBSVV FSOXC FNVRV MAN

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	2	2	2			15	2		1	1	3	2	7	5	5		1	3	4	4	1	15	2	5	1	
Replacement																										

10) [100 points] Compute the decryption matrix for the keyword **bleb**

$$\begin{pmatrix} B & L \\ E & B \end{pmatrix} \equiv \begin{pmatrix} 1 & 11 \\ 4 & 1 \end{pmatrix}$$



11) [115 points] Decode this quote from *The Hunger Games* that has been encoded using a Caesar cipher.

G	T	B	T	B	Q	T	G	,	L	T	'	G	T		B	P	S	A	N		X	C		A	D	K	T	,	H	D		X	I	'	H			
								,			'																	,						'				
P	A	A		G	X	V	W	I		I	D		Z	X	H	H		B	T		P	C	N	I	X	B	T		N	D	J		U	T	T	A		
A	X	Z	T		X	I	.																															
							.																															

12) [550 points] Solve this xenocrypt quote by Richard Nixon, which has been translated into Spanish and encoded with a K1 Alphabet with an English keyword

EF HT ID JCCFDENJE, HT EVMCFCJE GDCCTIJE. BDCT EF HT

ID JCCFDENJE, HT NJHJE WFLITCFJE.

K1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Ñ	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency		1	10	6	11	7	1	5	4	9		1	1	3							7		1	1			
Replacement																											

13) [150 points] Encode this quote from Louisa May Alcott's *Little Women* using the values a=9 and b=18

I	A	M	N	O	T	A	F	R	A	I	D	O	F	S	T	O	R	M	S	,	F	O	R	I	A	M
L	E	A	R	N	I	N	G	H	O	W	T	O	S	A	I	L	M	Y	S	H	I	P	.			

14) [575 points] Solve this patristocrat quote from one of the *Mortal Instruments* books. It has the word "love" in it three times.

ZGXNU SXTPF RZJZG GGXNU SXTTF WZGZR ZUPFR ZQWIU

EUZYG ZQUPQ WUEWI PWZGG GXNUS XTWIU F

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency					2	4	9		3	1				3		4	3	3	3	4	9		6	6	1	10
Replacement																										

15) [300 points] Solve this quote by William Jennings Bryan, which has been encoded using the Baconian cipher.

**A GIRL GAVE A VISIT TO ONE WHOSE STRAW PILLS ARISE
 TO OUR ATTIC IN HER LIMBS WE SEE A HAND AS YOU BE ITS
 DYING CURSE DOES A SPLIT MORON GUIDE WORLD AS YOU
 ANNOY EMILY AS NOW A HOME BUMPS GREEK BACON COMES
 SPILL AS YOU TASTE FISHY CYRUS BOOKS STRIP SOBER
 SWORE EARTH OTHER SPICY COINS CUTIE**

16) [350 points] Solve this aristocrat, a quote said by socialist Eugene V. Debs.

**C IUQM AP SPGAXVL XP ECFIX EPV; RL SPGAXVL CB XIM
 MUVXI, UAO C UR U SCXCYMA PE XIM TPVJO.**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	5	1	6		3	1	2		5	1		3	5		2	7	1	2	3	1	5	5		8	1	
Replacement																										

17) [200 points] Decode this vigenere, a quote by Dr. Wyatt from the TV show, *Grey's Anatomy*, that was encoded using the keyword **happiness**.

M	E	T	A	Q	A	K	Z	G	Y	R	X	Q	T	R	E	F	V	R	N	D	L	Q	A	K	L	Z	H	T	N

D	C	E	I	F	G	A	G	D	C	V	N	H	A	W	M	R	D	B	B	U	S	K	W	M	E	T	A	Q	A

K	K	L	O	A	I	H	B	U	I	H	G	P	N	I

The following tables might be useful during the event.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A

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

AAAAA	A	AABBA	G	ABBAA	N	BAABA	T
AAAAB	B	AABBB	H	ABBAB	O	BAABB	U/V
AAABA	C	ABAAA	I/J	ABBBA	P	BABAA	W
AAABB	D	ABAAB	K	ABBBB	Q	BABAB	X
AABAA	E	ABABA	L	BAAAA	R	BABBA	Y
AABAB	F	ABABB	M	BAAAB	S	BABBB	Z

Frequency Table of English letters:

E - 12.51%	S - 6.54%	C - 3.06%	G - 1.96%	K - 0.67%
T - 9.25%	R - 6.12%	U - 2.71%	W - 1.92%	X - 0.19%
A - 8.04%	H - 5.49%	M - 2.53%	Y - 1.73%	J - 0.16%
O - 7.60%	L - 4.14%	F - 2.30%	B - 1.54%	Q - 0.11%
I - 7.26%	D - 3.99%	P - 2.00%	V - 0.99%	Z - 0.09%
N - 7.09%				

Frequency Table of Spanish letters:

E - 14.08%	I - 5.98%	M - 3.08%	Y - 1.09%	Z - 0.47%
A - 12.16%	L - 5.24%	P - 2.89%	V - 1.05%	Ñ - 0.17%
O - 9.20%	D - 4.67%	B - 1.49%	G - 1.00%	X - 0.14%
S - 7.20%	T - 4.60%	H - 1.18%	F - 0.69%	K - 0.11%
N - 6.83%	U - 4.69%	Q - 1.11%	J - 0.52%	W - 0.04%
R - 6.41%	C - 3.87%			

For the purposes of cryptograms it is customary to treat n and ñ as distinct letters, but a and á are the same letter. Likewise for e and é, and i and í. In other words, all the accent marks get amputated when working with cryptograms. Also, while some older Spanish dictionaries consider ch, ll, and rr, to be their own letters—this has fallen out of modern usage. Accordingly, "burro" is considered as five letters: "b-u-r-r-o" and not as four letters "b-u-rr-o."

Famous Phrases

Gettysburg address

FOUR SCORE AND SEVEN YEARS AGO OUR FATHERS BROUGHT FORTH ON THIS CONTINENT, A NEW NATION, CONCEIVED IN LIBERTY, AND DEDICATED TO THE PROPOSITION THAT ALL MEN ARE CREATED EQUAL.

Declaration of Independence

WHEN IN THE COURSE OF HUMAN EVENTS IT BECOMES NECESSARY FOR ONE PEOPLE TO DISSOLVE THE POLITICAL BANDS WHICH HAVE CONNECTED THEM WITH ANOTHER AND TO ASSUME AMONG THE POWERS OF THE EARTH, THE SEPARATE AND EQUAL STATION TO WHICH THE LAWS OF NATURE AND OF NATURE'S GOD ENTITLE THEM, A DECENT RESPECT TO THE OPINIONS OF MANKIND REQUIRES THAT THEY SHOULD DECLARE THE CAUSES WHICH IMPEL THEM TO THE SEPARATION.

Constitution of United States of America

WE THE PEOPLE OF THE UNITED STATES, IN ORDER TO FORM A MORE PERFECT UNION, ESTABLISH JUSTICE, INSURE DOMESTIC TRANQUILITY, PROVIDE FOR THE COMMON DEFENSE, PROMOTE THE GENERAL WELFARE, AND SECURE THE BLESSINGS OF LIBERTY TO OURSELVES AND OUR POSTERITY, DO ORDAIN AND ESTABLISH THIS CONSTITUTION FOR THE UNITED STATES OF AMERICA.

MAGNA CARTA (In Latin)

JOHANNES DEI GRACIA REX ANGLIE, DOMINUS HIBERNIE, DUX NORMANNIE, AQUITANNIE ET COMES ANDEGAVIE, ARCHIEPISCOPI, EPISCOPI, ABBATIBUS, COMITIBUS, BARONIBUS, JUSTICIARIIS, FORESTARIIS, VICECOMITIBUS, PREPOSITIS, MINISTRIS ET OMNIBUS BALLIVIS ET FIDELIBUS SUIS SALUTEM.

Communist Manifesto

THE HISTORY OF ALL HITHERTO EXISTING SOCIETY IS THE HISTORY OF CLASS STRUGGLES. FREEMAN AND SLAVE, PATRICIAN AND PLEBEIAN, LORD AND SERF, GUILD-MASTER AND JOURNEYMAN, IN A WORD, OPPRESSOR AND OPPRESSED, STOOD IN CONSTANT OPPOSITION TO ONE ANOTHER, CARRIED ON AN UNINTERRUPTED, NOW HIDDEN, NOW OPEN FIGHT, A FIGHT THAT EACH TIME ENDED, EITHER IN A REVOLUTIONARY RECONSTITUTION OF SOCIETY AT LARGE, OR IN THE COMMON RUIN OF THE CONTENDING CLASSES.

1) [215 points] Decode this quote from the old show *I Love Lucy*. The first two letters map out to ID.

E	'	F	X	Q	H	Z	K	X	X	K	U	X	K	H	H	Z	K	H	Z	E	D	U	C	E	'	R	K	F	I	D	K
	'																								'						
H	Z	Q	D	X	K	U	X	K	H	H	Z	K	H	Z	E	D	U	C	E	Z	Q	R	K	D	'	H	F	I	D	K	.
																									'						

2) [250 points] Encode the word **playground** using the keyword **OSTRACIZE**.

$$\begin{pmatrix} O & S & T \\ R & A & C \\ I & Z & E \end{pmatrix} \equiv \begin{pmatrix} 14 & 18 & 19 \\ 17 & 0 & 2 \\ 8 & 25 & 4 \end{pmatrix}$$

P	L	A	Y	G	R	O	U	N	D		

3) [175 points] Decode the text below using the keyword **JEEP**.

$$\begin{pmatrix} J & E \\ E & P \end{pmatrix} \equiv \begin{pmatrix} 9 & 4 \\ 4 & 15 \end{pmatrix}$$

R	S	A	L	U	Q	N	O	H	J	C	K	C	F

4) [275 points] Decode this quote from Georg C. Lichtenberg that has been encoded using a 9 letter keyword. The 28th through 36th letters (XUWJGOMFF) map out to **INARYMENMA**

X	A	G	K	A	V	Z	S	G	V	L	R	Z	I	V	W	F	E	N	L	V	L	Z	C	W	J	W	X	U	Y	J	G	O	M	F

F	P	R	C	L	P	G	L	A	L	R	V	T	W	Z	K	M	K	P	W	P	A	Z	T	C	B	W	K	P	W	N	W	I	T	A

G	X	P	Z	W	S	V	F	A	A	F	E	S	C

5) [215 points] Encode this quote from the musical *Hamilton* using Karl Marx's *Communist Manifesto* as the key.

E	V	E

R	Y	O

N	E	S

H	A	L

L	S	I

T	U	N

D	E	R

T	H	E

I	R	O

W	N	V

I	N	E

A	N	D

F	I	G

T	R	E

E	A	N

D	N	O

O	N	E

S	H	A

L	L	M

A	K	E

T	H	E

M	A	F

R	A	I

D

6) [200 points] The following quote from *Harry Potter and the Sorcerer's Stone* has been encoded using a famous document. What does it say?

E	A	X	N

S	R	L	H

K	T	S	U

K	V	I	O

Q	V	Z	N

R	N	Z	Z

V	L	M	G

A	M	B	R

F	I	B	X

G	B	Y	T

I	F	W	M

Z	C	X	P

L	H	W	Y

H	X	O	H

X	Y	V	V

W	W	K	L

O	Y	Y	Y

I	A	S	D

I	C	N	K

Q	G	N	O

T

7) **[100 points]** Agent Bobert has faithfully followed the steps of the RSA key-generation algorithm. But has forgotten the last step—how to encrypt a message. First, Here are the results from the other steps:

$$\begin{aligned} p &= 1217 & e &= 5054497 \\ q &= 9337 & \phi &= 11352576 \\ d &= 4617697 & n &= 11363129 \end{aligned}$$

As it comes to pass, Agent Jennifer is on vacation in Hawaii, and Agent Bobert needs a document that is stored in the company safe. They are communicating via email, and both know it is very unwise to trust the security of computers in a hotel lobby. Agent Bobert needs to tell Agent Jennifer his public key, knowing well that it can be read by untrustworthy parties. List the minimum set of numbers that Agent Bobert needs to email to Agent Jennifer in order for Agent Jennifer to be able to decode the message.

Additionally, Agent Jennifer wants to transmit the combination to the safe (which is 89771) in the response email, but encrypted with RSA. What should formula should Agent Jennifer compute in order to know the ciphertext to transmit?

Enter the minimum values to transmit:

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Enter the formula (using correct numbers) to transmit:

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8) **[265 points]** Special Agent, Joshua, has the following RSA public key:

$$n = 197801 \quad e = 186805$$

Unfortunately for him, a quantum computer has successfully factored him n

$$197801 = 887 * 223$$

Compute the value of his private key:

Enter the computed private key:

--

9) **[305 points]** John and Kaitlyn are accountants for a very large bank, and have started a friendship. They communicate via email, because they live thousands of miles apart. Kaitlyn gets curious and asks John the year that they were born. John doesn't mind telling Kaitlyn, but they know that the bank monitors all employee emails, and is afraid of being the victim of age discrimination. Therefore, Kaitlyn suggests that they use RSA, and they provides their public key: (12629063, 250219). John replies with the ciphertext 5405012. Kaitlyn's private key is 1803547. In what year was John born?

Enter the answer:

10) **[300 points]** Brett, has faithfully followed the steps of the RSA key-generation algorithm. Here are the results:

$$p = 1439$$

$$q = 2099$$

$$n = 3020461$$

$$\phi = 3016924$$

$$e = 2729827$$

Unfortunately, Brett doesn't know how to compute the value of d and needs you to do that final step for him.

Enter the computed value of d , NOT the formula.

11) [120 points] James and Christian want to communicate with each other using RSA for encryption. James generates RSA keys obtaining the following values:

$$\begin{aligned} \phi &= 27660240 & d &= 7002847 \\ e &= 14572063 & q &= 2953 \\ p &= 9371 & n &= 27672563 \end{aligned}$$

Likewise, Christian also generates RSA keys resulting in the values

$$\begin{aligned} e &= 23083765 & d &= 7361413 \\ p &= 4943 & n &= 23345789 \\ q &= 4723 & \phi &= 23336124 \end{aligned}$$

They ask each other for the public keys in order to communicate. What information do they each need to transmit in response?

You must also determine what formula James needs to calculate in order to transmit the value 15591 to Christian

Enter the minimum values that Christian needs to transmit to James:

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Enter the minimum values that James needs to transmit to Christian:

--	--	--

Write the formula James needs to calculate in order to transmit the value 15591 to Christian

12) [650 points] Solve this Spanish xenocrypt, which is a quote by John F. Kennedy that has been translated into Spanish.

IO FYUWLP IZ OY OIS QI OY KLQY, S YÑAI00PZ ÑAI ULHYX

ZPOP YO BYZYQP P YO BHIZIXGI ZIEAHYUIXGI IDGHYVYHYX

IO MAGAHP.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Ñ	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	5	2		1	1	1	4	6	14		1	3	1		2	10	7	3		2		3	1	1	4	14	6
Replacement																											