



# Lessons of the Kobayashi Maru: If You're Not Cheating, You're Not Trying

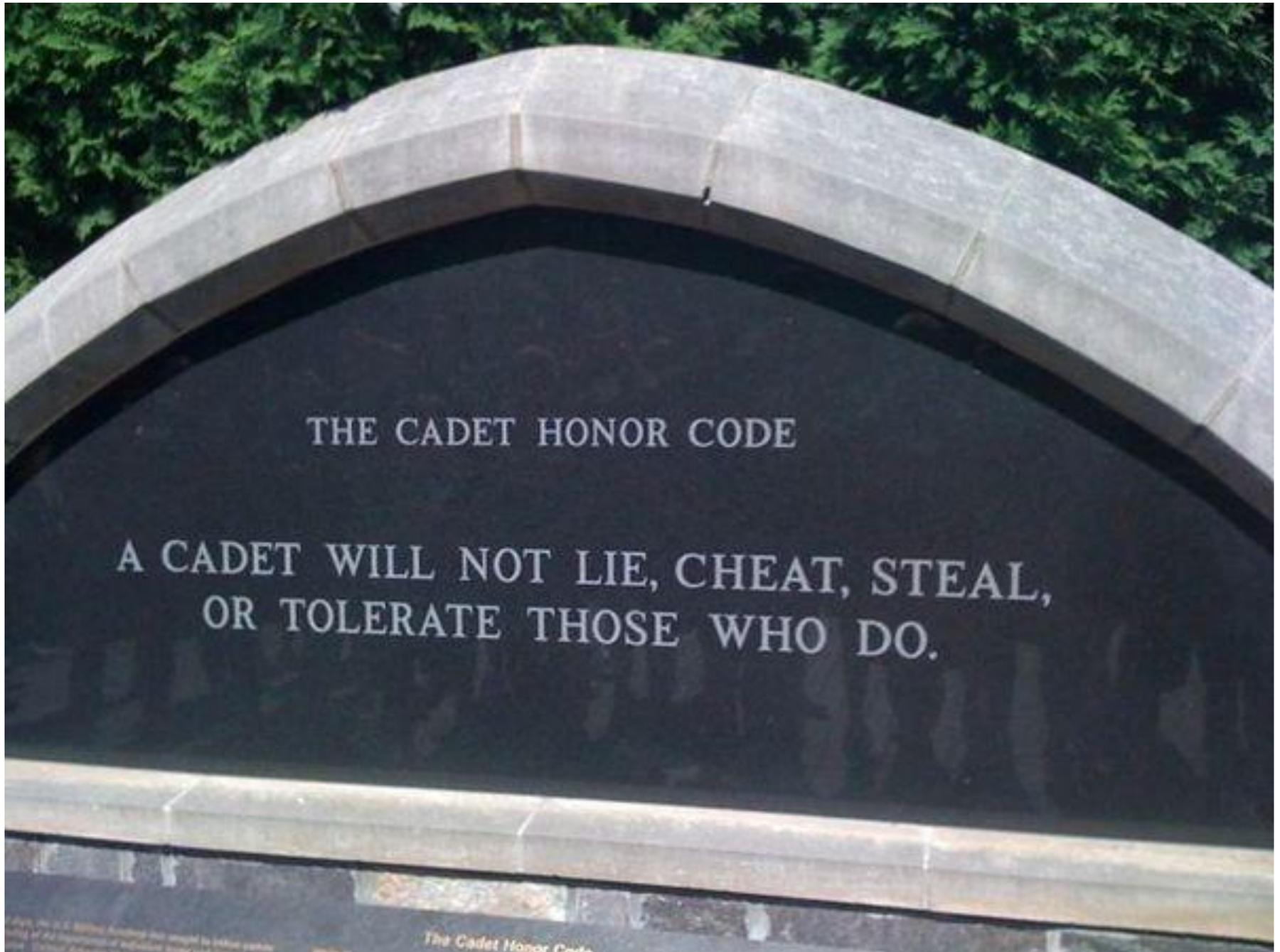
James Caroland  
U.S. Cyber Command

Greg Conti (*in absentia*)  
West Point

April 19, 2012  
SOURCE Conference Boston

# Disclaimer

**The views in this article are the author's and don't reflect the official policy or position of the United States Military Academy, the Department of the Army, the Department of the Navy, United States Cyber Command, the Department of Defense, or the United States Government.**









Everyone starts with 10 points.

Example 1. If you answer all questions correctly you will keep your 10 pts.

Example 2. If you miss/fail 3 test questions, your final score is 7 points.





Joint Advanced Cyber Warfare Course (JACWC)

# Setup of "Test"

- Provide virtually no notice
- Choose "unfair" problem
- Tell students we don't want them to study... we want them to cheat
- Collaborative cheating was encouraged, but this exercise wasn't a blanket license to cheat throughout the course

3.141592653589  
79323846264338  
32795028841971  
69399375105820  
97494459230781  
64062862089986  
28034825342117  
06798214808651  
32823066470938  
44609550582231  
72535940812848  
11174502841027  
01938521055596  
44622948954930

# Examples



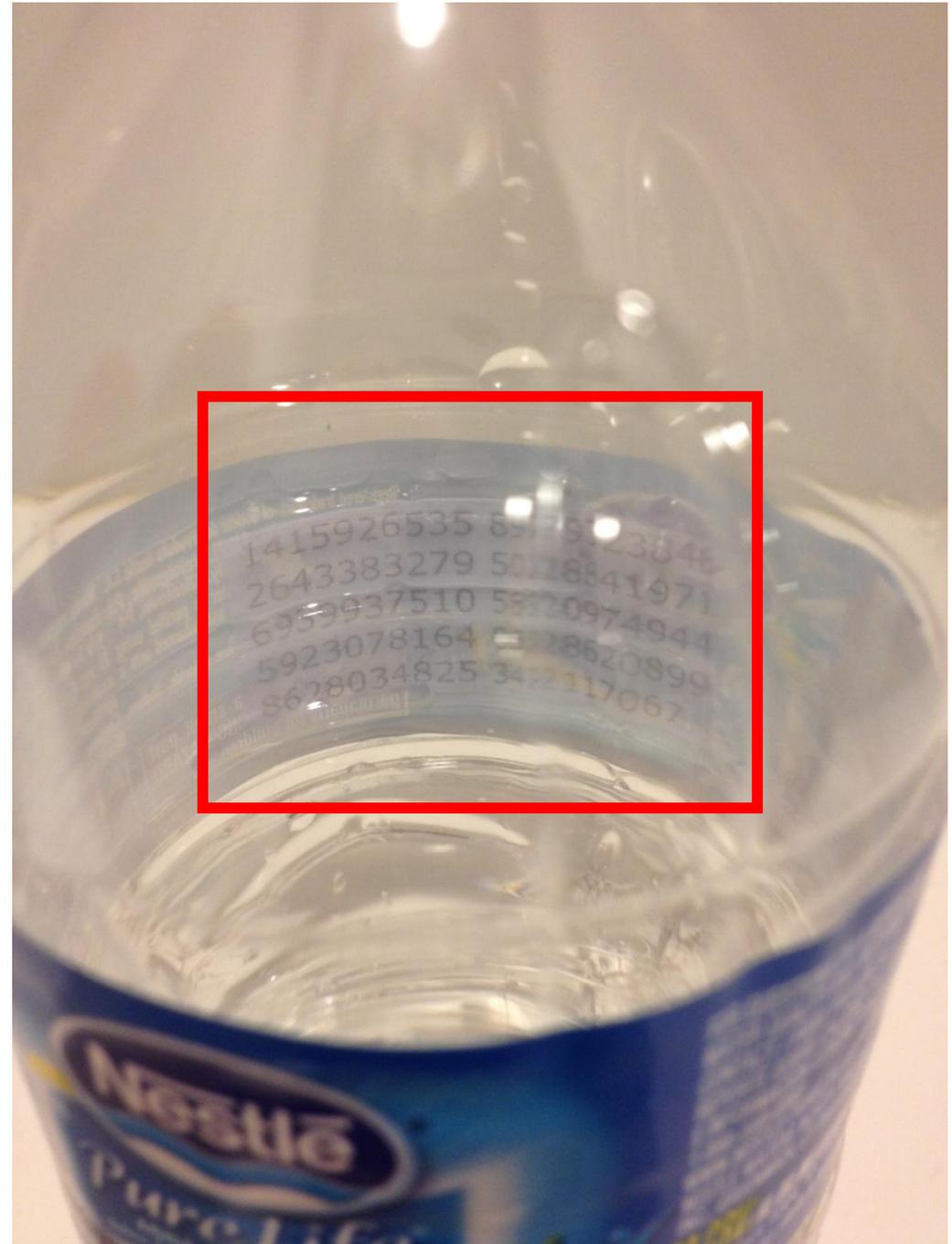
# The Thirst Quencher



# The Thirst Quencher, Diet Version



# The Zero Calorie Thirst Quencher



# The Ceiling Tile



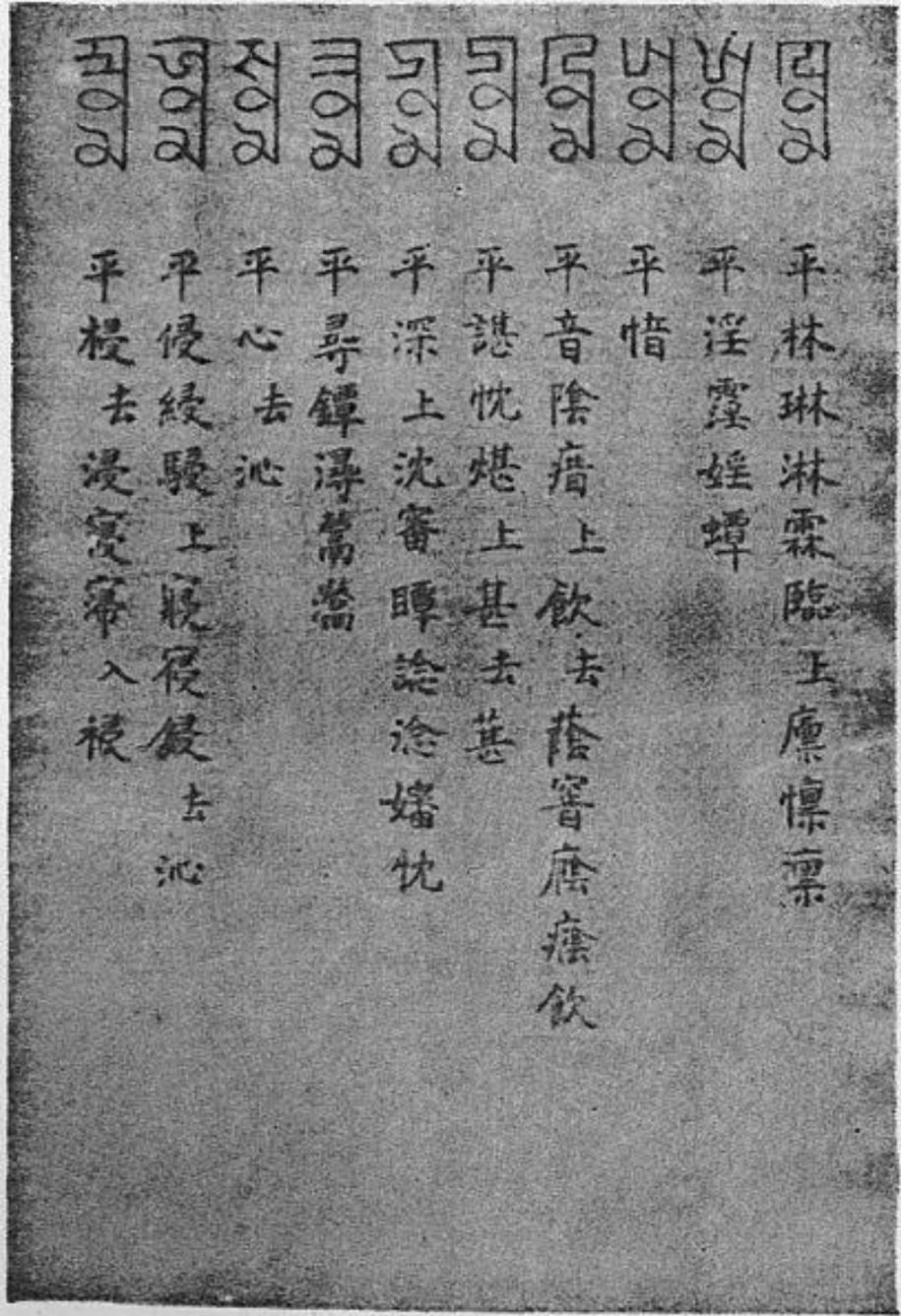
# Hiding in Plain Sight



# Prepositioned Answers



# Alternate Encoding



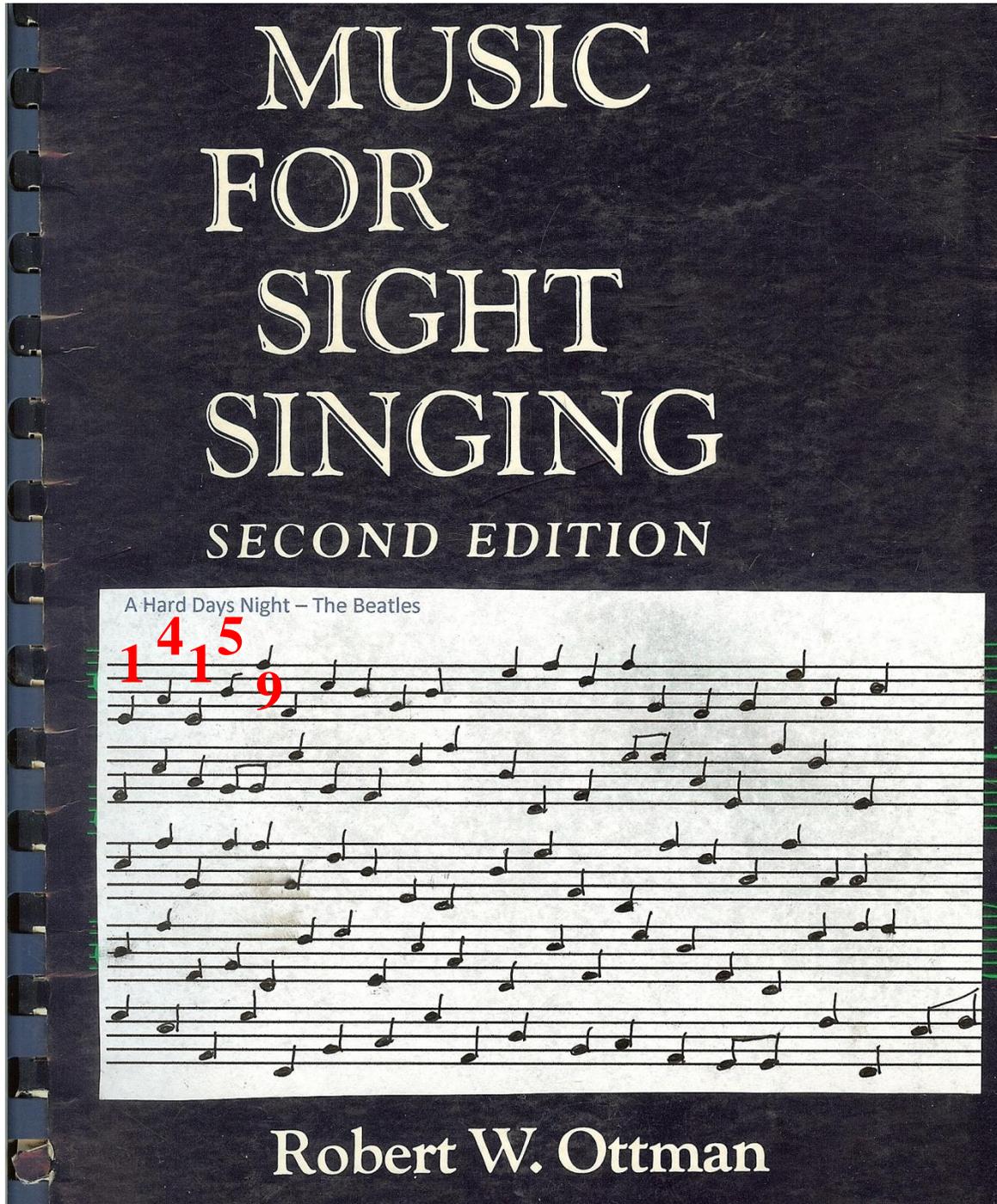
# Morse Code

**October 30, 2011 -  
November 05, 2011**

October 2011							November 2011						
S	M	T	W	T	F	S	S	M	T	W	T	F	S
						1			1	2	3	4	5
2	3	4	5	6	7	8	6	7	8	9	10	11	12
9	10	11	12	13	14	15	13	14	15	16	17	18	19
16	17	18	19	20	21	22	20	21	22	23	24	25	26
23	24	25	26	27	28	29	27	28	29	30			
30	31												

	30 Sun	31 Mon	1 Tue	2 Wed	3 Thu	4 Fri	5 Sat
7 am					Travel via Bus (Group	Travel	

# Music Notes



# Story Encoded

NOW I DEIFY A TENET GALLANTLY OF CIRCLE CANON LAW THOSE  
INTEGERS IMPORTING CIRCLES' QUOTIENTS ARE, WE SEE, UNWIELDY  
LONG SERIES OF COCKLE BURS PUT ALL TOGETHER, GET NO CLARITY,  
MNEMONICS SHANT DESCRIBETH SO REFORMED CREATING, WITH A  
GRAMMERCY PLAINLY, A SONNET LIBERATED YET CONFORMED STRANGELY  
THE QUEEREST RULES I MANIPULATE BEING FOLLOWED, DO

# Story Encoded

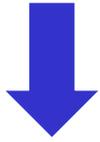
I made a rat lap in jail. My life  
peak beam. We name for a change. Rummy  
foaming boils, I now favor the bag dash.  
A bump pam a glad slave nose big  
roper. nail. Boney mask fade char's  
china fish nice fib. Feevish naves  
morphine loomer noted gas shake.



visit [hampton.com](http://hampton.com) or call **1.800.hampton**

thought pad.

# Cadaeic Cadenza



3.141593

3.1415925535 79793238626433832  
79502884197168399374105  
82097484459230781640528620944  
98428834442534211067

During my rather long nap, the <sup>extolling all by now, obsolete lore</sup> weirdest tap  
An ominous vibrating sound disturbing my chamber's antedoor.  
This, ~~at~~ I whispered quietly, I ignore

Perfectly, the intalled rem<sup>em</sup>bers, the ghostly fires, a glittering ember.  
Inflamed by lightning's outbursts, windows cast penumbras  
upon this floor

Sorrowful, as one mistreated, unhappy thoughts I heeded  
That inimitable table of elegance - Lenore -  
is delighting, exciting, never more

ominously, curtains parted, my serenely departed

[Midnights so dreary, tired and weary,  
Silently pondering volumes] extolling all by-now obsolete lore.  
During my rather long nap - the weirdest tap!  
An ominous vibrating sound disturbing my chamber's antedoor.  
"This", I whispered quietly, "I ignore".

# The Classic



# Precompiled Answer

Begin your essay on this page. If you need more space, continue on the next page.

In today's "Global Community" it is ever more important that human beings, as a species, solve problems that not only affect people in their immediate communities, but also solve those problems which affect the nation as a whole. As Kase Thomas Tom Clancy's book <sup>Red Hell</sup> said "Together we can improve the world in which we live in but divided we shall be destroyed." The most obvious example of the benefits of a united nation solving problems together is China. Similarly philanthropist Bill Gates also believes in solving problems of the United States.

When people hear the words "people's Republic of China," they think Tian an men square massacre, Forbidden City, Communism, etc. Unfortunately, those people do not see the clear coherent group of people cooperating and solving problems of their nation together. Every town has a vote and people are allowed to vote on national issues only. Should China allow Intel to establish their factories in China? Six years ago, the people of China voted yes on this issue. Should we pass environmental law 23 which bans the loss of DDT in China? Again the people voted yes. Together, once yearly basis, the people of China get together to solve problems which can affect their nation economically and environmentally. Today, people in the United States can see how strong and powerful China has become through the work of its people. After that rant on China, I will turn to the United States where Bill and Melinda Gates are two people on a mission to solve the nation's problems of poverty and hunger here in the United States.

Bill and Melinda Gates, well... what can one say about that philanthropic couple? From the numerous soup kitchens this famous couple has personally set up to the Bill and Melinda Gates foundation, these two people have donated much of their income to good causes. This couple has touched thousands of people and continue to do so everyday. They have earned themselves the good will of the

rand()

3.1415926535 + 90 random digits

# Cheating with "Integrity"

Kobayashi Maru

656c1ee50d1fa9de3b77d72b22641eeb

MD5 hash of first 100 digits of PI

# Power Point



Slide 1

3.14159265358  
7932384626433  
3279502884197  
6939937510582  
9749445923078

Slide 2



Slide 3

# Fake Screensaver

3141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117067



3141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117067



3141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117067



3141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117067



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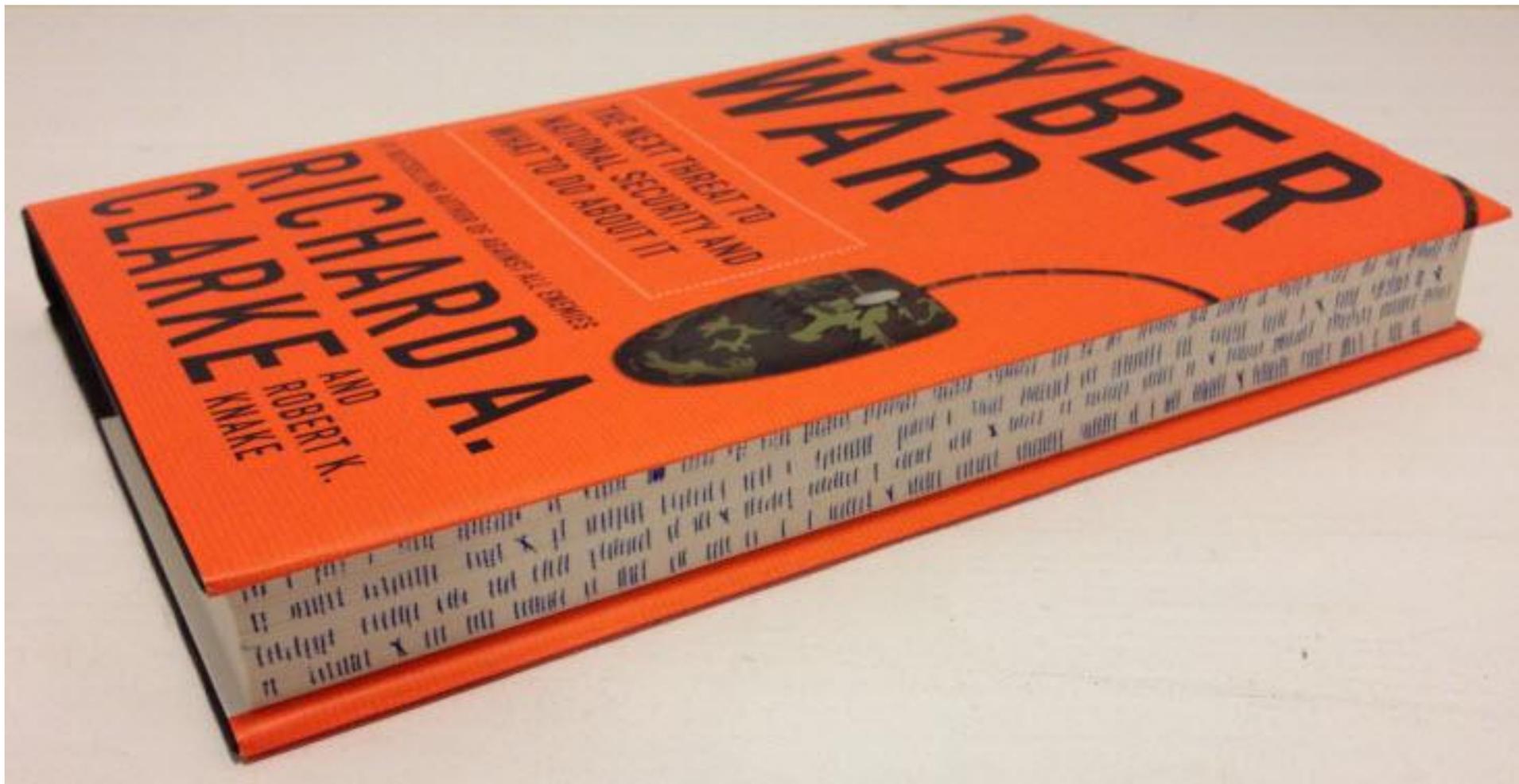


Microsoft®

™

**Windows**<sup>®</sup> **xp**  
Professional

# Hash marks



Obscured by wholesome goodness



# Ubiquitous Coffee



# Ubiquitous Coffee



# Starbucks ... Now Serving Pi



Reference: 31415926535

Date: 04/09/2012 07:40AM

CSR: MUSHINA K.

\*\*\*CUSTOMER COPY\*\*\*

SALES RECEIPT SALES RECEIPT

8 979323846	MOCHA G	3.50
Sales ID: - - -	26433	
8 327950288	LATTE G	2.50
Sales ID: - - -	41971	
6 939937510	LATTE T	2.50
	Subtotal:	5.82
	Tax:	0.97
	Total:	4.94
	CASH:	45.92
	CHANGE:	- 30.78



164 06286 20899 862803 4825 342117067 11111111111

Please Keep Your Receipt  
Thank you for drinking this crap.

<http://www.starbucks.com/coffee>

# Visual Covert Channel

'Visual 'Covert Channel'

'Blinks the laptop's numlock light, counting out the 100 first digits of pi

'For Kobayashi Maru EX, 9 April 2012

```
Public Declare Sub Sleep Lib "kernel32.dll" (ByVal dwMilliseconds As Long)
```

```
Sub pi()
```

```
Dim piVar() As Variant
```

```
Dim i, j As Integer
```

```
piVar = Array(3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5, 8, 9, 7, 9, 3, 2, 3, 8, 4, 6, 2, 6, 4, 3, 3, 8, 3, 2, 7, 9, 5, 0, 2, 8, 8, 4,  
1, 9, 7, 1, 6, 9, 3, 9, 9, 3, 7, 5, 1, 0, 5, 8, 2, 0, 9, 7, 4, 9, 4, 4, 5, 9, 2, 3, 0, 7, 8, 1, 6, 4, 0, 6, 2, 8, 6, 2, 0, 8, 9,  
9, 8, 6, 2, 8, 0, 3, 4, 8, 2, 5, 3, 4, 2, 1, 1, 7, 0, 6, 7, 9)
```

```
For i = 0 To 99
```

```
'looping 100 times through pi array
```

```
For j = 1 To piVar(i)
```

```
'looping the count of that digit of pi
```

```
Beep
```

```
'audible beep, for debugging
```

```
SendKeys "NUMLOCK", True
```

```
'light on
```

```
DoEvents
```

```
'make sure the key-press is registered
```

```
Sleep (100)
```

```
'length of blink
```

```
SendKeys "NUMLOCK", True
```

```
'light off
```

```
DoEvents
```

```
Sleep (300)
```

```
'Pause between count
```

```
Next j
```

```
Sleep (900)
```

```
'Pause between pi digits
```

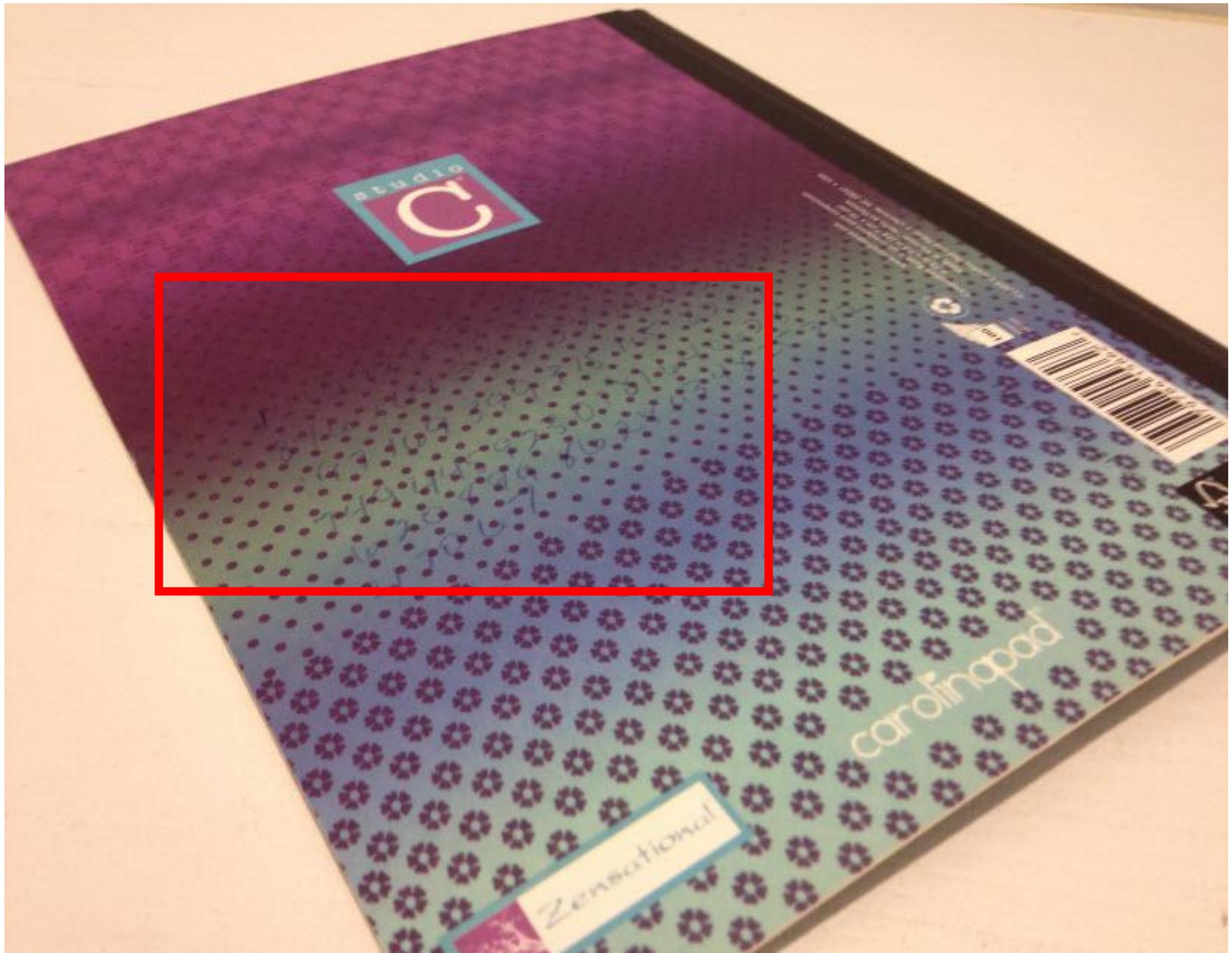
```
Next i
```

```
End Sub
```

# Notebook Camouflage

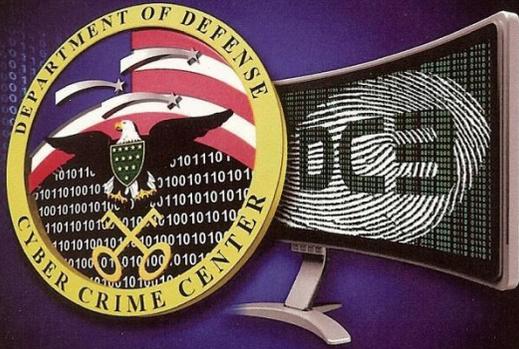


# Notebook Camouflage



# Ninja Camouflage

DEPARTMENT  
OF  
DEFENSE  
CYBER CRIME  
CENTER



**A National Cyber Center**

**A National Cyber Center**

413924535857932384626433  
8327950288419716939937510  
58209700005023078240638  
62089986739343217767

413924535857932384626433  
8327950288419716939937510  
58209700005023078240638  
62089986739343217767

# Imprint

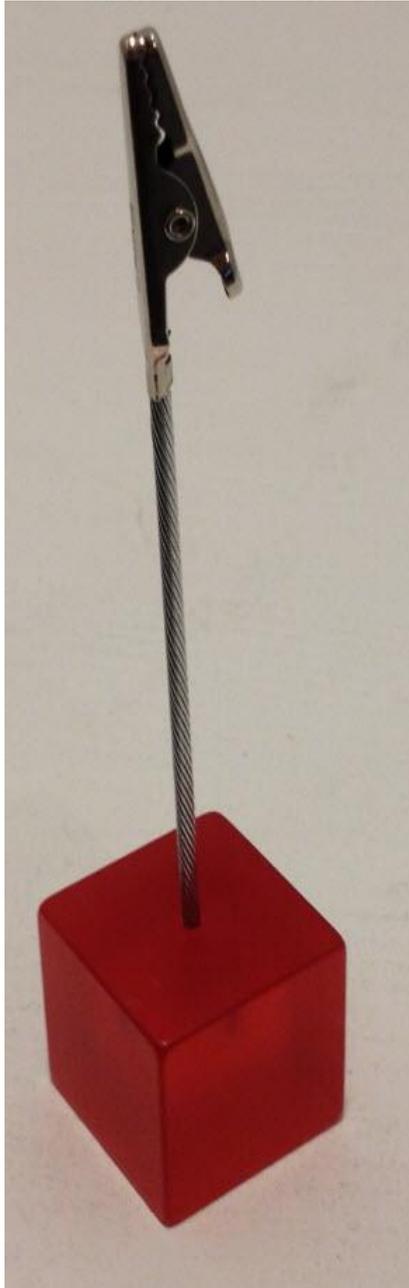
StaybridgeSuites.com | 800.238.8000

**3 1 4 15**

# Watermark

31415926535 8979323846 26433832  
5820974944 5923078164 062862089

# Roach clip engraving



# Shove It Into the Cloud

Take the info provided by M. Moss on Friday last; put this info into the sacred "cloud" and label it X; recall info from cloud as needed; therefore Pi to 100 digits = X



Take the info provided by M. Moss on Friday last; put this info into the sacred "cloud" and label it X; recall info from cloud as needed; therefore Pi to 100 digits = X

# Fake Barcodes

EN1



9 2 6 5 3 5 8 9 7 9 3 2 3 8 4 6 2 6 4 3 3 8 3 2 7

EN2



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

EN3



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

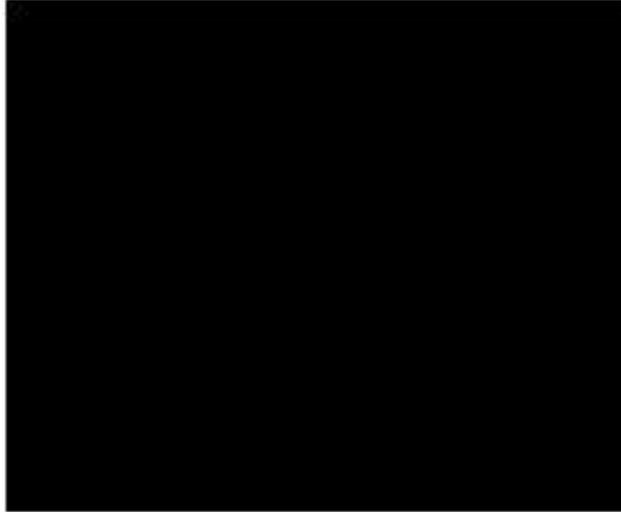
EN4



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

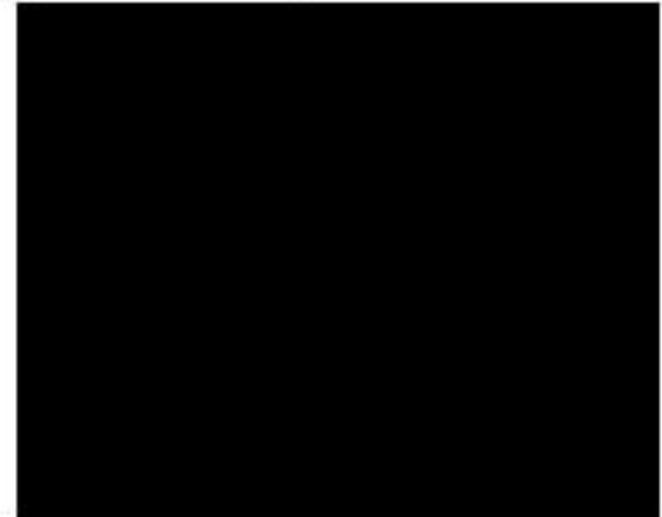
# Fake Business Cards

9ec4c12949a4f31474f299058ce2b22a



9ec4c12949a4f31474f299058ce2b22a

592653589793238462643383279502884197169399375105



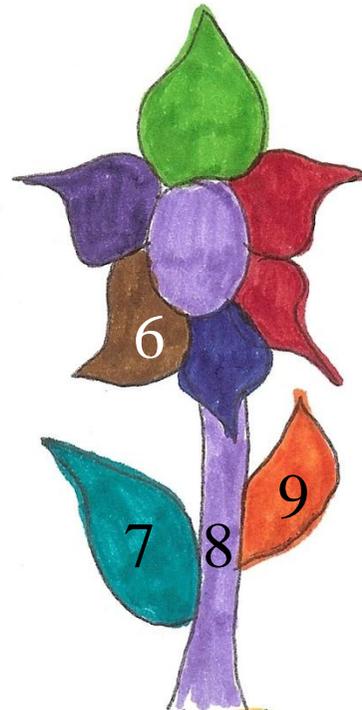
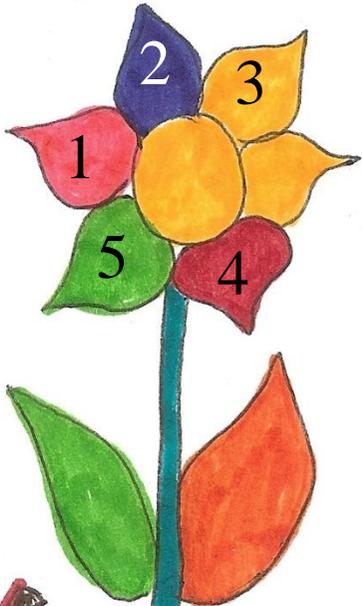
820974944592307816406286208998628034825342117067

# Customized jewelry



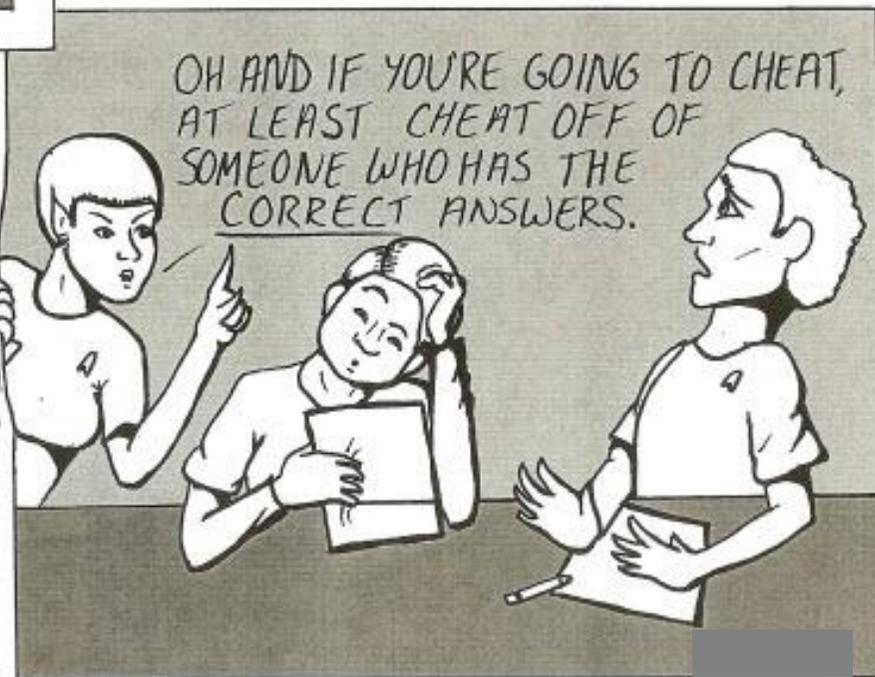
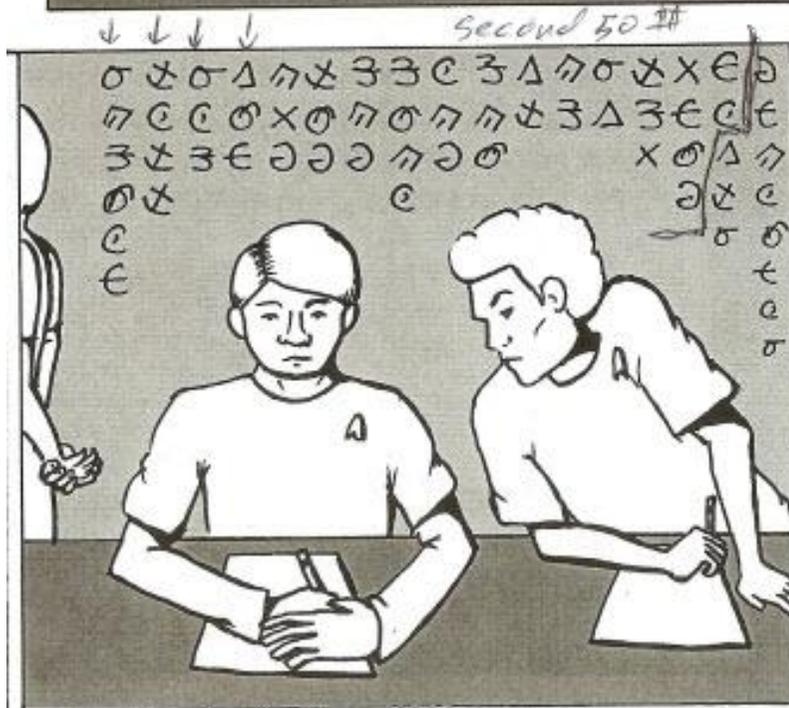
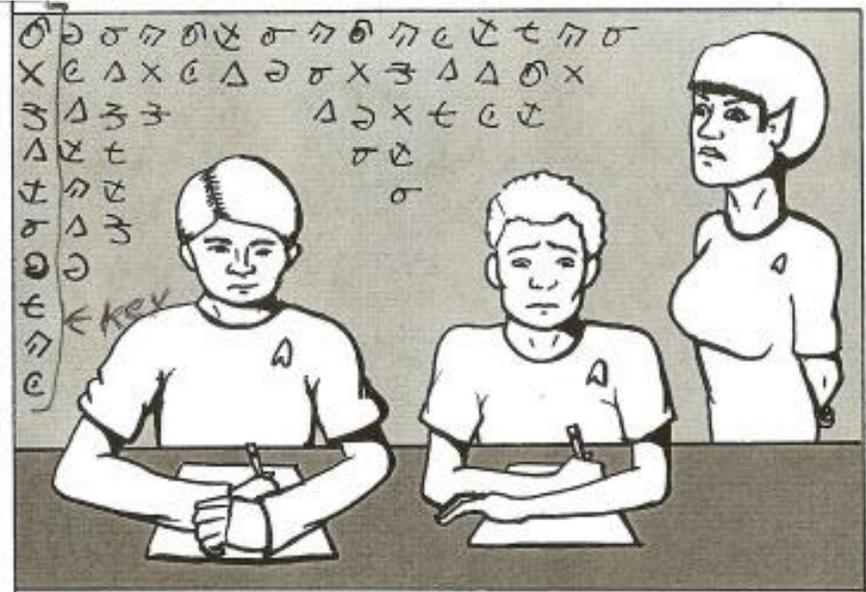
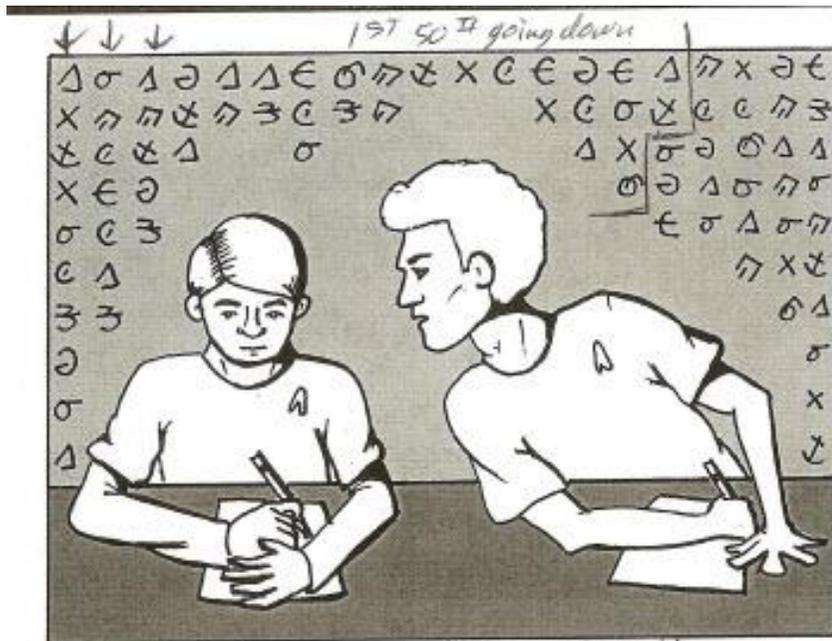
Color coded

Happy Easter Daddy!



We Love You!

# Artist daughter + code



# Non-Cheater

A Mathematician in class actually  
memorized pi to 100 digits



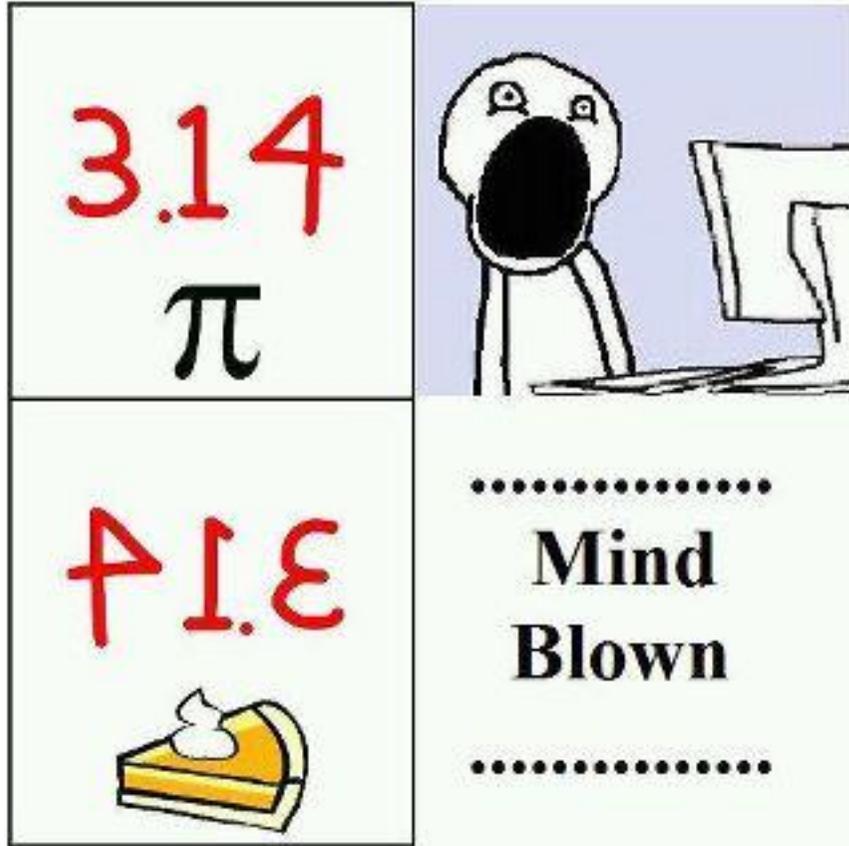
# Security Lessons Learned

- Most people are pretty darn good at cheating
  - Especially the quiet ones
- Cheaters, like adversaries ...
  - Exploit explicit and implicit trust
  - Exploit laziness
  - Exploit predictability
  - Exploit limitations of human senses
  - Use everyday objects
  - Look where no one else is looking
  - Use uncommon skill sets
  - Have backup plans

# What's Next?

- Improve the Kobayashi Maru exercise
- Exploring collaborative cheating akin to adversary
- Additional exercises to understand adversary mindset
- Beyond understanding to influencing adversary mindset
- Research into “Cyber Psychology”
- Collaboration on innovative training methods

# Acknowledgements



I'd like to thank...

Greg Conti, Peiter "Mudge" Zatko, TJ White, Eric McKissick, Mark Moss, and all the JACWC students as well as the SOURCE Conference staff

See also...

Gregory Conti and James Caroland. "Embracing the Kobayashi Maru - Why You Should Teach Your Students to Cheat." IEEE Security and Privacy, July/August 2011.

