

# *Math and Words*

*An useless (or maybe not) application of mathematics*

Francesco Dolce



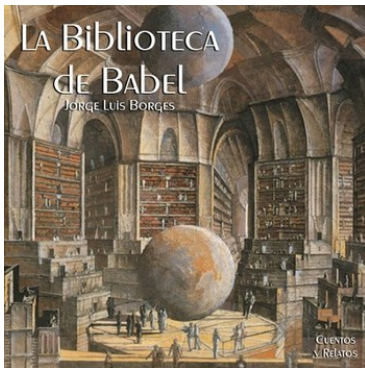
**Ahoj FIT! 2026**

Prague - September 16th, 2026



# Relaxing Readings

*Knihy na odpočinek*



## The Library of Babel

*Bábelská knihovna*  
(J.L. Borges)



## A Short Stay in Hell

*Krátký pobyt v pekle*  
(S.L. Peck)

# *Poll's time*

*Čas na anketu!*

Each book has 410 pages, with on each page 40 lines of 80 characters over a 95 letters alphabet.

How many books are there in the library?

1.  $\sim$  # books in Czechia.
2.  $\sim$  # grains on sand on all beaches in Europe.
3.  $\sim$  # atoms in the whole Universe.

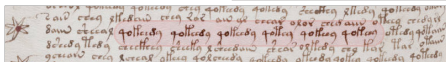
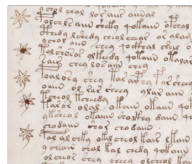
Forgot how to count? Try **BIE-PKM!**

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# The Voynich Manuscript

Voynichův rukopis



Interested in hidden messages? Check **BIE-KAB** !

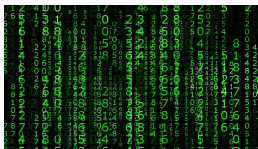
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# Combinatorics On Words

*Kombinatorika Repetitivních a Aperiodických Vzorů v Abecedách*



ACGATACGGACATTACATATACG



000, 001, 010, 011, 010,  
011, 100, 101, 110, 111

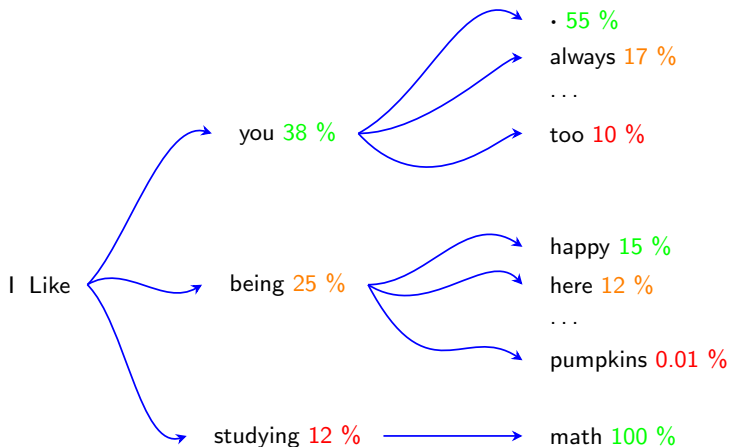
# *Random generation of words*

*Náhodné generování slov*



# Random generation of words

Náhodné generování slov



Randomness and probability ? More on **BIE-PST** ! (maybe)

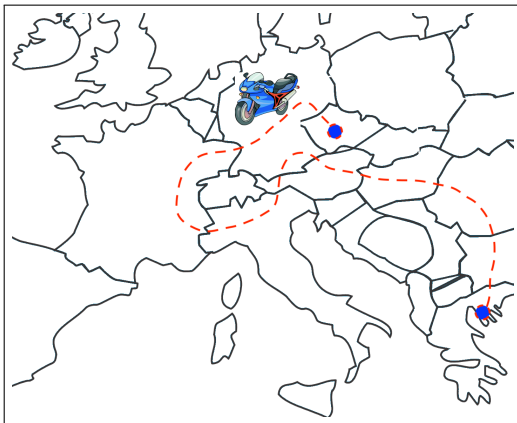
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IN PRAGUE

*Don't donut and drive*

*Neříd'te pod vlivem trdelníku*



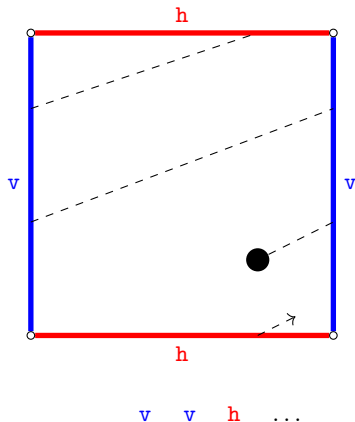
Č D F I A D A H R B E

Want to ride smoothly and continuously ? **BIE-MA1 !**

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# *Don't donut and drive*

*Neříd'te pod vlivem trdelníku*



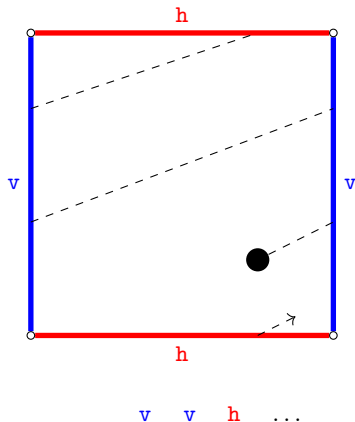
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# *Don't donut and drive*

*Neříd'te pod vlivem trdelníku*



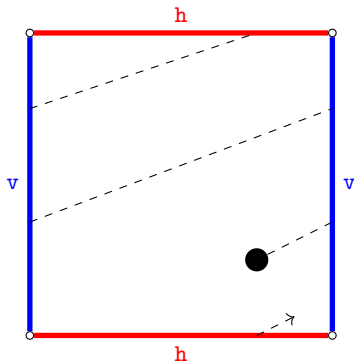
Want to ride smoothly and continuously? **BIE-MA1!**

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*Don't donut and drive*

*Neříd'te pod vlivem trdelníku*



v v h ...

Want to ride smoothly and continuously? **BIE-MA1!**

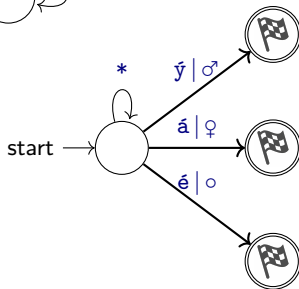
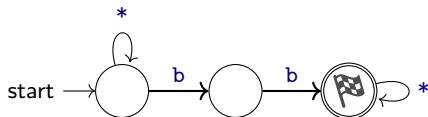
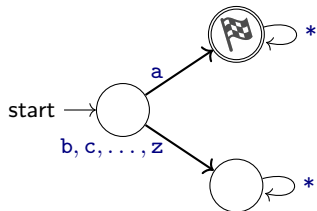
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# Automata

## Automaty

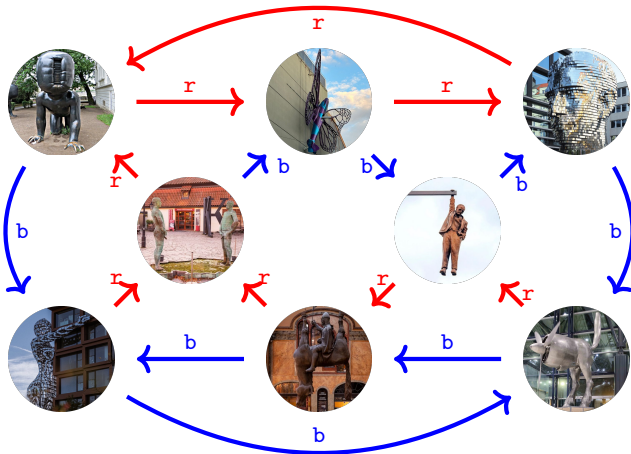


Want to play with automata? Go to **BIE-AAG**!

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# Černý Conjecture

## Černého domněnka



Walking along a graph? Do it in **BIE-AG1**.

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# *Burrows-Wheeler Transform*

*Burrowsova-Wheelerova transformace*

b a n a n a





# Burrows-Wheeler Transform

*Burrowsova-Wheelerova transformace*

```
b  a  n  a  n  a
   a  n  a  n  a  b
     n  a  n  a  b  a
       a  n  a  b  a  n
         n  a  b  a  n  a
           a  b  a  n  a  n
```





# Burrows-Wheeler Transform

*Burrowsova-Wheelerova transformace*

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| a | b | a | n | a | n |
| a | n | a | b | a | n |
| a | n | a | n | a | b |
| b | a | n | a | n | a |
| n | a | b | a | n | a |
| n | a | n | a | b | a |



Do you know what matrices are? Find out in **BIE-LA1**!

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# Burrows-Wheeler Transform

*Burrowsova-Wheelerova transformace*

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| a | b | a | n | a | n |
| a | n | a | b | a | n |
| a | n | a | n | a | b |
| b | a | n | a | n | a |
| n | a | b | a | n | a |
| n | a | n | a | b | a |



$\text{bwt}(\text{banana}) = \text{nnbaaa}$

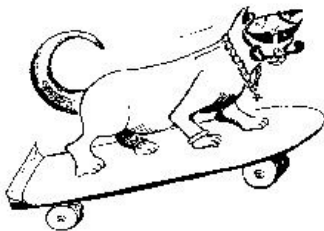
Do you know what matrices are? Find out in **BIE-LA1**!

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# Palindromes

## Palindromy



G O F L O W O L F O G

$w_1 w_2 \cdots w_n$  palindrome  $\Leftrightarrow w_1 = w_n \wedge w_2 = w_{n-1} \wedge \dots w_n = w_1$

What does  $\Leftrightarrow$  mean? And  $\wedge$ ? The answer on **BIE-LOG**!

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# *Palindromes*

## *Palindromy*

🇬🇧 kayak, radar, otto, TacoCat

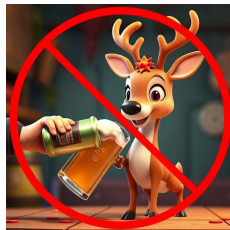


# Palindromes

## Palindromy

🇬🇧 kayak, radar, otto, TacoCat

🇨🇪 oko, blb, nepochopen, JelenoviPivoNelej



Build your own palindromes on **BIE-DML** !

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# Palindromes

## Palindromy

🇬🇧 kayak, radar, otto, TacoCat

🇨🇪 oko, blb, nepochopen, JelenoviPivoNelej

1 3 5 7 9 7 5 3 1



SIGNATE SIGNATE MERE ME TANGIS ET ANGIS  
ROMA TIBI SUBITO MOTIBUS IBIT AMOR.

# *Rich or full ? Tasty !*

*Počítání palindromů*

pizza

→

p, i, z, a  
zz



# *Rich or full? Tasty!*

## *Počítání palindromů*

pizza

→

p, i, z, a  
z z

5 = 5 ✓



# *Rich or full? Tasty!*

## *Počítání palindromů*

pizza

→

p, i, z, a  
zz

5 = 5 ✓



ananas

→

a, n, s,  
ana, nan  
anana

6 = 6 ✓



# *Rich or full? Tasty!*

## *Počítání palindromů*

pizza → p, i, z, a  
zz  $5 = 5$  ✓



ananas → a, n, s,  
ana, nan  
anana  $6 = 6$  ✓



hawaiianpizza → h, a, w, i, n, p, z  
ii, zz,  
awa,  
aiia  $11 < 13$  ✗



Thank you for you attention  
and  
Welcome to FIT !

