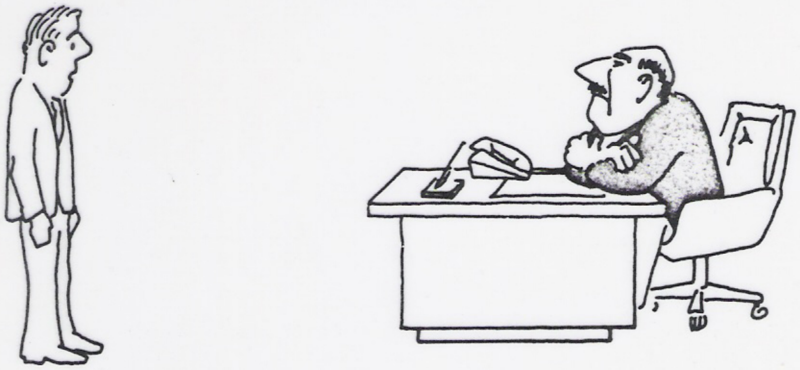
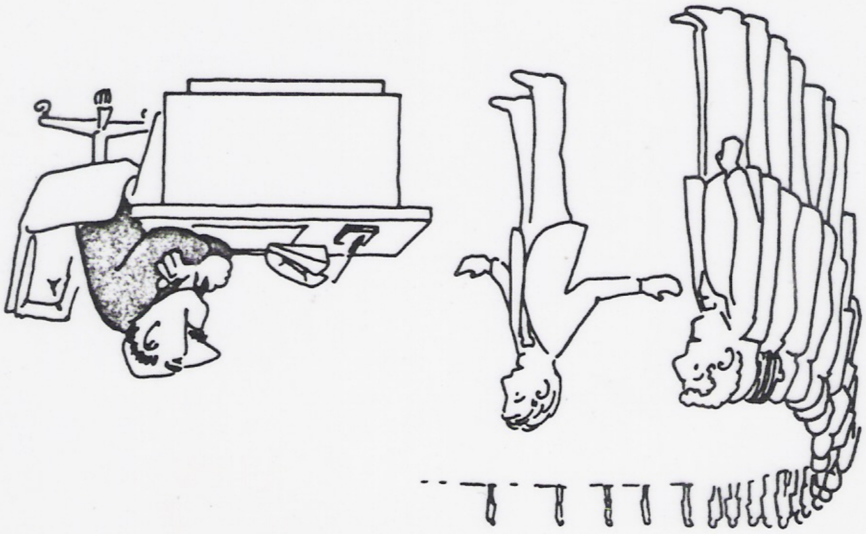


"I can't find an efficient algorithm, I guess I'm just too dumb."

"I can't find an efficient algorithm, because no such algorithm is possible!"



"I can't find an efficient algorithm, but neither can all these famous people."

Time complexity function	Size n					
	10	20	30	40	50	60
n	.00001 second	.00002 second	.00003 second	.00004 second	.00005 second	.00006 second
n^2	.0001 second	.0004 second	.0009 second	.0016 second	.0025 second	.0036 second
n^3	.001 second	.008 second	.027 second	.064 second	.125 second	.216 second
n^5	.1 second	3.2 seconds	24.3 seconds	1.7 minutes	5.2 minutes	13.0 minutes
2^n	.001 second	1.0 second	17.9 minutes	12.7 days	35.7 years	366 centuries
3^n	.059 second	58 minutes	6.5 years	3855 centuries	2×10^8 centuries	1.3×10^{13} centuries

Figure 1.2 Comparison of several polynomial and exponential time complexity functions.

Time complexity function	Size of Largest Problem Instance Solvable in 1 Hour		
	With present computer	With computer 100 times faster	With computer 1000 times faster
n	N_1	$100\ N_1$	$1000\ N_1$
n^2	N_2	$10\ N_2$	$31.6\ N_2$
n^3	N_3	$4.64\ N_3$	$10\ N_3$
n^5	N_4	$2.5\ N_4$	$3.98\ N_4$
2^n	N_5	$N_5+6.64$	$N_5+9.97$
3^n	N_6	$N_6+4.19$	$N_6+6.29$

Figure 1.3 Effect of improved technology on several polynomial and exponential time algorithms.

LINGUAGEM

- SEJA Σ UM CONJUNTO DE SÍMBOLOS

  Σ^* É O CONJUNTO DE TODOS OS "STRINGS" DE TAMANHO FINITO SOBRE Σ

$\Sigma = \{0,1\} \therefore \Sigma^* = \{\epsilon, 0, 1, 00, 01, 10, 11, 000, \dots\}$

$L \subset \Sigma^*$ É UMA LINGUAGEM SOBRE O ALFABETO Σ

EXEMPLOS:

$\Sigma = \{0,1\}$

$L_1 = \{01, 001, 111, 01101011\}$

$L_2 = \{x \in \Sigma^* \mid x$ É A REPRESENTAÇÃO BINÁRIA DE UM MÚLTIPLO DE 4 $\}$