

# CSC104 fall 2012

Why and how of computing

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BA4270 (behind elevators)

Course web page

416-978-5899

Text: [Picturing Programs](#)

# Outline

Introduction

History of representing information

Notes



## Two tracks in this course

- ▶ History of computing technology, overview of modern computing OS, social issues
  
- ▶ Insight into computing mindset: problem-solving and programs

# How to do well at this course

- ▶ Read the **course information sheet** as a two-way promise
- ▶ Question, answer, record, synthesize
- ▶ Collaborate with respect

# In media res

racing with Alice

Representing even simple information is hard. Let's race through this table:

b <sub>7</sub> → b <sub>6</sub> → b <sub>5</sub> →						0	0	0	0	1	1	1	1
Bits						0	1	2	3	4	5	6	7
b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	Column Row									
0	0	0	0	0	NUL	DLE	SP	0	@	P	'	p	
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q	
0	0	1	0	2	STX	DC2	"	2	B	R	b	r	
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s	
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t	
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u	
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v	
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w	
1	0	0	0	8	BS	CAN	(	8	H	X	h	x	
1	0	0	1	9	HT	EM	)	9	I	Y	i	y	
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z	
1	0	1	1	11	VT	ESC	+	;	K	[	k	{	
1	1	0	0	12	FF	FC	,	<	L	\	l		
1	1	0	1	13	CR	GS	-	=	M	]	m	}	
1	1	1	0	14	SO	RS	.	>	N	^	n	~	
1	1	1	1	15	SI	US	/	?	O	_	o	DEL	

# Early devices

## tally systems



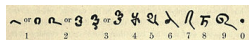
Clay tablets, read-only when baked,  
read/write when sundried,  
have been in use for at least 5,000 years.

Abacuses, or abaci, have been  
in use for nearly as long



# Number systems and gears

ancient world



Hindu-Arabic numbers: positional notation,  
and zero over 2000 years ago  
slick algorithms, e.g. long multiplication

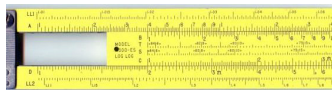
Antikythera mechanism  
make us re-think  
ancient technical skills





# Gears and rules

machine age



Add powers (logs) to multiply quickly, extract roots

Read the gears to extract taxes — Pascaline



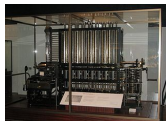
# Looms and engines

industrial revolution



Jacquard loom combined steam and punch cards for automatic patterns

Babbages difference engine would have evaluated polynomials like  $3x^3 + 5x^2 - 7x + 9$



Before we continue the history of devices that represent and manipulate values, we'll stop to try out a modern environment that does these things. We'll need to:

- ▶ Start up the **DrRacket** programming environment
- ▶ Experiment with various values, including images, thanks to tools from **Picturing Programs**

# Notes