

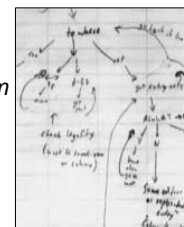
# COMPSCI 111 / 111G

*Mastering Cyberspace:  
An introduction to practical computing*

## Spreadsheets

# VisiCalc

The idea for the electronic spreadsheet came to me while I was a student at the Harvard Business School, working on my MBA degree, in the spring of 1978. Sitting in Aldrich Hall, room 108, I would daydream. "Imagine if my calculator had a ball in its back, like a mouse..." (I had seen a mouse previously, I think in a demonstration at a conference by Doug Engelbart, and maybe the Alto). And "...imagine if I had a heads-up display, like in a fighter plane, where I could see the virtual image hanging in the air in front of me. I could just move my mouse/keyboard calculator around, punch in a few numbers, circle them to get a sum, do some calculations, and answer '10% will be fine!'" (10% was always the answer in those days when we couldn't do very complicated calculations...)

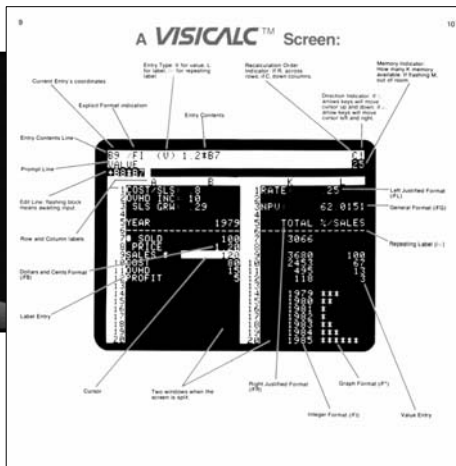
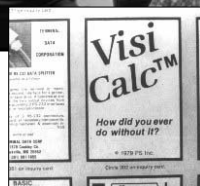


Source: [www.bricklin.com/history/intro.htm](http://www.bricklin.com/history/intro.htm)

## Development

### Background

- Dan Bricklin and Bob Frankston
- VisiCalc appeared in 1979.



## Design

### Visible Calculator

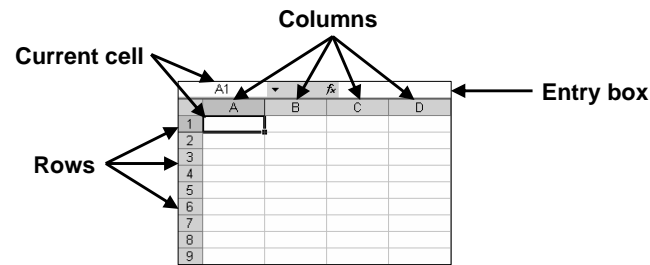
- Organize calculations as we would on paper... in columns and rows.
- Supports automatic updating of calculations.
- Copy formulas so we may apply these to large amounts of data.
- Spreadsheets are applications designed for numeric processing.

ITEM	NO.	UNIT	COST
MUCK RAKE	43	10	55.00
BUZZ CUT	1	100	10.00
TOP TONER	250	4.90	1240.00
EYE SNUFF	2	9.90	19.80
SUBTOTAL			1315.00
9.75% TAX			128.00
TOTAL			14438.16

# Microsoft Excel - Overview

## Used to represent a table of data

- Rows (labelled with numbers)
- Columns (labelled with letters)
- Cells



[http://en.wikipedia.org/wiki/Microsoft\\_Excel](http://en.wikipedia.org/wiki/Microsoft_Excel)

# Changing appearance of cells

## Alter Size

- Click on cell separator and drag

## Add Borders

- Format Cell

## Add Shading

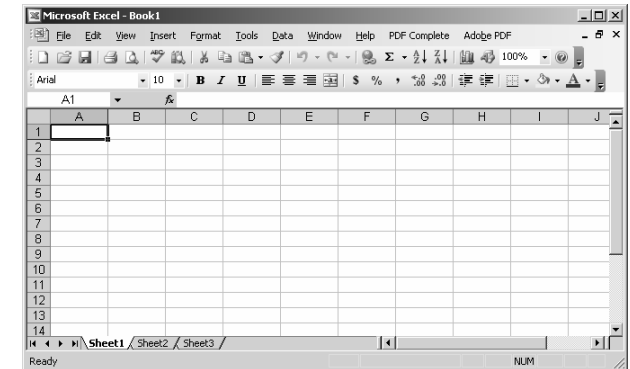
- Format Cell

## Font

- Style
- Size
- Alignment

## Numbers

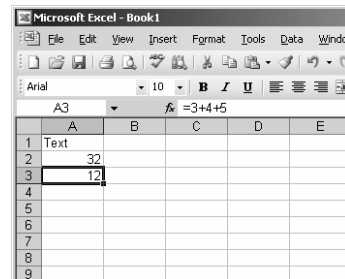
- Decimal points



# Entering Data

## Cells contain

- Text
- Numbers
- Formulae



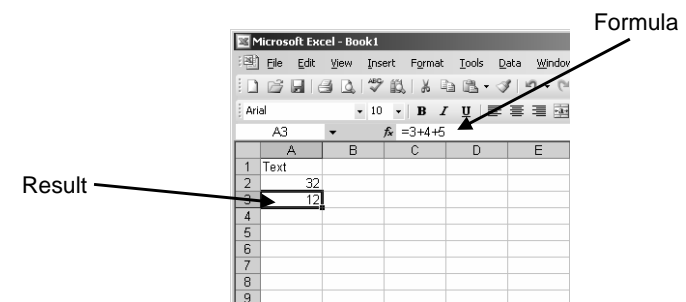
## Entry box

- Type data in entry box
- Hit Enter key to accept value
- All formulae are recalculated
- Results shown in each cell

# Formulae

## Entering formulae

- Always begin with an equals sign
- Calculation typed into entry box
- Result displayed in the cell



# Using Cell References

## Cell Reference

- Formulae refer to other cells
- Specify cell location using Row and Column

	A	B	C	D	E
1					
2	Hours Worked				
3					
4	Name	Monday	Tuesday	Total	
5	Joe	12	6	18	
6	Jenny	23	21		
7	John	4	8		
8	Julia	1	9		
9					

# Filling Down and Filling Right

## Save time

- Fill many cells with same contents
- Select a group of cells
- Fill Right
- Fill Down

	A	B	C	D
1		100		
2				
3				
4				
5				

	A	B	C
1		100	
2			
3			
4			
5			
6			
7			
8			
9			
10			

Select cells

	A	B	C
1		100	
2		100	
3		100	
4		100	
5		100	
6		100	
7		100	
8		100	
9		100	
10		100	

Fill Down

	A	B	C
1		100	
2			
3			
4			
5			
6			
7			
8			
9			
10			

Selected and Fill Right

# Filling Cells with Formulae

## Use Fill Down/ Fill Right on formulae

- Saves us entering new formula for each row

	A	B	C	D	E
1					
2	Hours Worked				
3					
4	Name	Monday	Tuesday	Total	
5	Joe	12	6	18	
6	Jenny	23	21		
7	John	4	8		
8	Julia	1	9		
9					

- D5 should contain  $=B5 + C5$
- D6 should contain  $=B6 + C6$
- D7 should contain  $=B7 + C7$
- D8 should contain  $=B8 + C8$

# Relative References

## Cell reference in formula

- Use same formula, different cell references
- Cell reference is relative to position of formula
- Spreadsheets adjust formula automatically during fill operation

	A	B	C	D	E
1					
2	Hours Worked				
3					
4	Name	Monday	Tuesday	Total	
5	Joe	12	6	18	
6	Jenny	23	21		
7	John	4	8		
8	Julia	1	9		
9					

# Exercises

## Ticket Sales

- Calculate the number of tickets remaining
- What formula in cell D6?

	A	B	C	D
1	<b>Tickets sales</b>			
2				
3	Price	\$10.00		
4				
5	Event	Tickets Available	Tickets Sold	Remaining
6	Cycling	4000	2000	2000
7	Weightlifting	2000	750	1250
8	Triathlon	1000	100	900
9	Soccer	3000	3000	0
10	Badminton	5000	4500	500
11		15000	10350	4650

# Cell references that don't change

## Absolute references

- Sometimes the cell reference should not change
- Use a dollar sign \$ before the row or column

	A	B	C	D	E	F
1	<b>Hours Worked</b>					
2						
3						
4	Pay Rate :	\$10.00				
5						
6	Name	Monday	Tuesday	Total	Pay rate	
7	Joe	12	6	18	10	
8	Jenny	23	21	44	10	
9	John	4	8	12	10	
10	Julia	1	9	10	10	

formula stays the same

# Relative and Absolute references

*Sometimes formulae require a mixture of references that change and references which are fixed*

	A	B	C	D	E
1	<b>Hours Worked</b>				
2					
3					
4	Pay Rate :	\$10.00			
5					
6	Name	Monday	Tuesday	Total	Total Pay
7	Joe	12	6	18	180
8	Jenny	23	21	44	440
9	John	4	8	12	120
10	Julia	1	9	10	100
11					

= D7 \* \$B\$4

# Exercises

## Ticket Sales

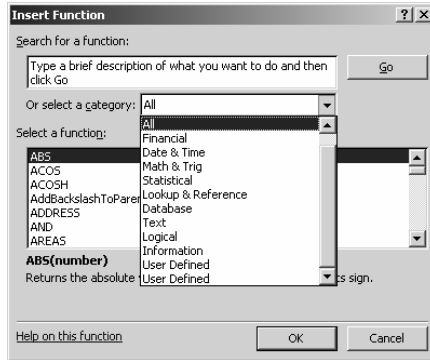
- Calculate the money earned by selling tickets
- What formula in cell E8?

	A	B	C	D	E
1	<b>Tickets sales</b>				
2					
3	Price	\$10.00			
4					
5	Event	Tickets Available	Tickets Sold	Remaining	Sales
6	Cycling	4000	2000	2000	\$20,000.00
7	Weightlifting	2000	750	1250	\$7,500.00
8	Triathlon	1000	100	900	\$1,000.00
9	Soccer	3000	3000	0	\$30,000.00
10	Badminton	5000	4500	500	\$45,000.00

# Using built-in functions

## Insert a Function

- Many categories
- Help is useful



# Functions

## Many functions exist

- Allow us to make more complicated formulae
- Examples
  - SUM
  - MAX
  - MIN
  - AVERAGE

## Specifying a range of cells

- Top Left cell
- Bottom Right cell
- B6:C10

	A	B	C	D	E
1	Hours Worked				
2					
3					
4	Pay Rate :	\$10.00			
5					
6	Name	Monday	Tuesday	Total	Total Pay
7	Joe	12	6	18	180
8	Jenny	23	21	44	440
9	John	4	8	12	120
10	Julia	1	9	10	100

Functions may apply to a cell or a range of cells

# Exercises

## Ticket Sales

- Add up the columns
- What formula in cell B11?

	A	B	C	D	E
1	<b>Tickets sales</b>				
2					
3	Price	\$10.00			
4					
5	Event	Tickets Available	Tickets Sold	Remaining	Sales
6	Cycling	4000	2000	2000	\$20,000.00
7	Weightlifting	2000	750	1250	\$7,500.00
8	Triathlon	1000	100	900	\$1,000.00
9	Soccer	3000	3000	0	\$30,000.00
10	Badminton	5000	4500	500	\$45,000.00
11		15000	10350	4650	\$103,500.00

# Boolean Logic

## Boolean value

- True or False
- 2-valued logic

## Compare two different values

- =
- >
- <
- >=
- <=

## Example. Are the following true or false?

- =(3 = 4)
- =(4 < 6)
- =(MAX(5, 6) = 5)
- =(SUM(1,2,3) = 6)

# Boolean Functions

## AND( a, b )

- True only when a and b are both true

## OR( a, b )

- True if either a is true or b is true

## NOT( a )

- True only when a is false

## Are the following formulae TRUE or FALSE?

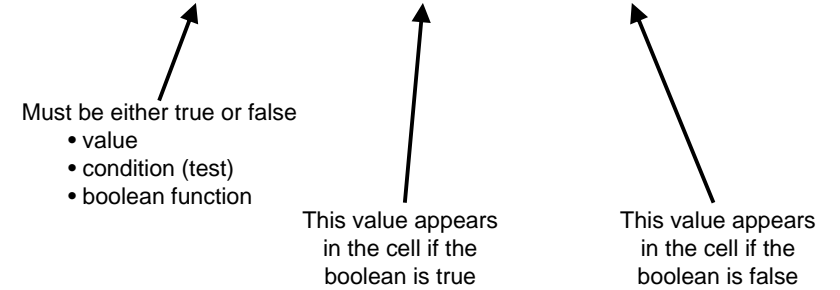
- =AND( 3 = 4, 2 = 2 )
- =OR( 7 < 5, 3 > 3 )
- =NOT( 3 = 2 )
- =OR( AND( 2 = 3, 4 > 3 ), NOT( 2 = 3 ) )

# IF functions

## Makes a decision

- Different values used in the cell depending on the logical test

## IF( logical\_test , value\_if\_true, value\_if\_false )



# Exercises

## Ticket Sales

- If less than 50% of the tickets were sold, then the venue was too large
- What formula in cell F7?

	A	B	C	D	E	F
1	<b>Tickets sales</b>					
2						
3	Price	\$10.00				
4						
5	Event	Tickets Available	Tickets Sold	Remaining	Sales	Venue too large?
6	Cycling	4000	2000	2000	\$20,000.00	No
7	Weightlifting	2000	750	1250	\$7,500.00	Yes
8	Triathlon	1000	100	900	\$1,000.00	Yes
9	Soccer	3000	3000	0	\$30,000.00	No
10	Badminton	5000	4500	500	\$45,000.00	No
11		15000	10350	4650	\$103,500.00	

# Exercises

## Ticket Sales

- Check if more than 90% of the tickets were sold, or if less than 50% of the tickets were sold. In either case, a new venue is required next time.
- What formula in cell G9?

	A	B	C	D	E	F	G	H
1	<b>Tickets sales</b>							
2								
3	Price	\$10.00						
4								
5	Event	Tickets Available	Tickets Sold	Remaining	Sales		Different venue required	
6	Cycling	4000	2000	2000	\$20,000.00		No	
7	Weightlifting	2000	750	1250	\$7,500.00		Yes	
8	Triathlon	1000	100	900	\$1,000.00		Yes	
9	Soccer	3000	3000	0	\$30,000.00		Yes	
10	Badminton	5000	4500	500	\$45,000.00		No	
11		15000	10350	4650	\$103,500.00			