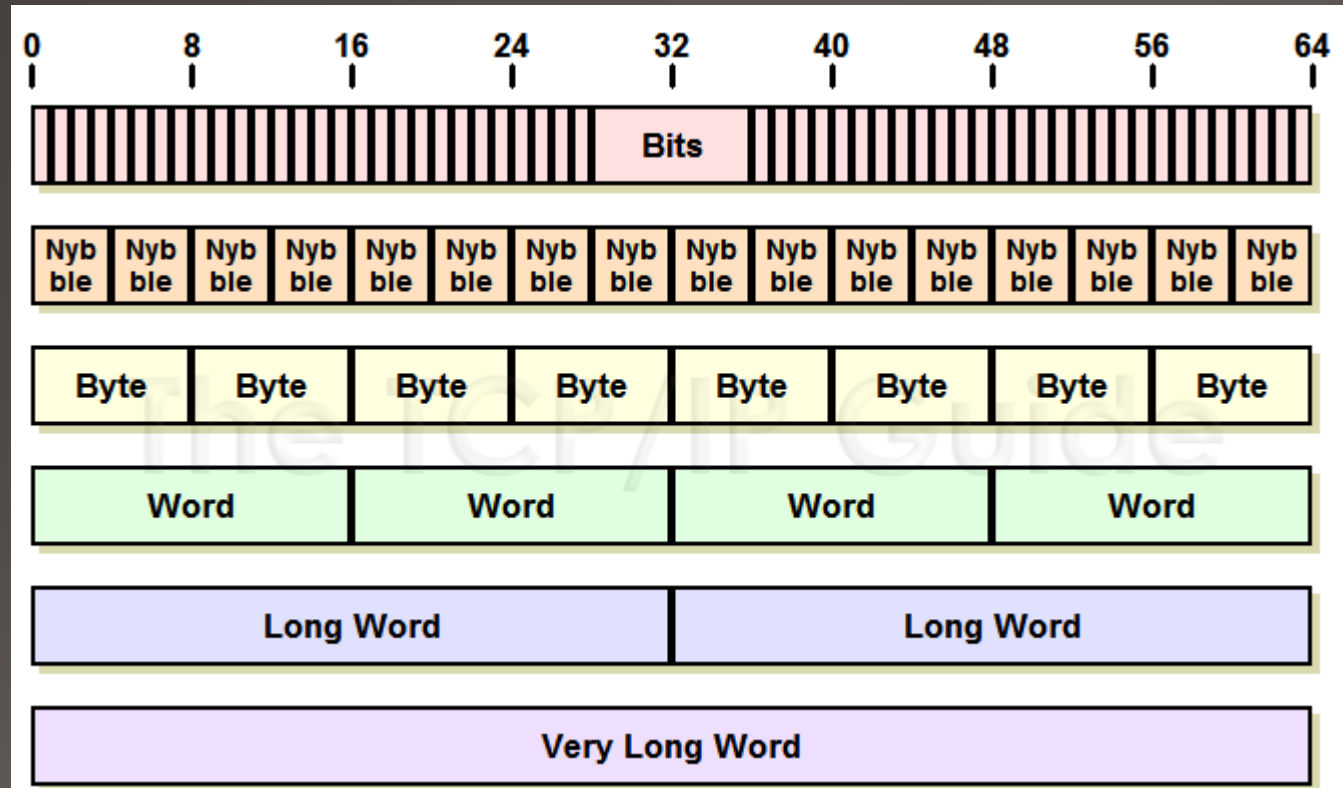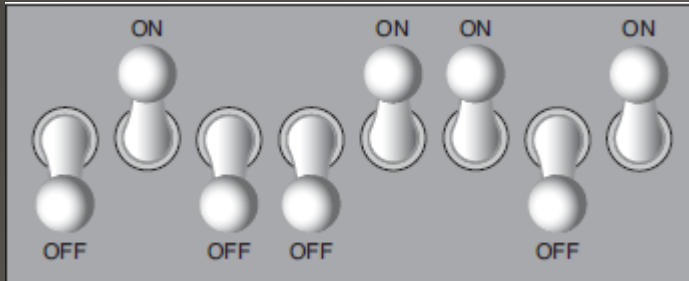# Chapter 1

Storing data

How Computers Store Data

- Bytes: a series of 8 binary digits
- Each binary digit represents a switch
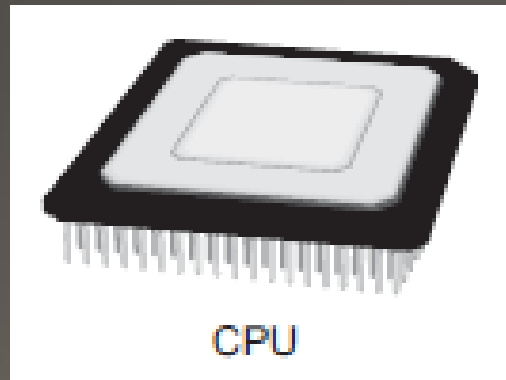
ASCII Code: Character to Binary

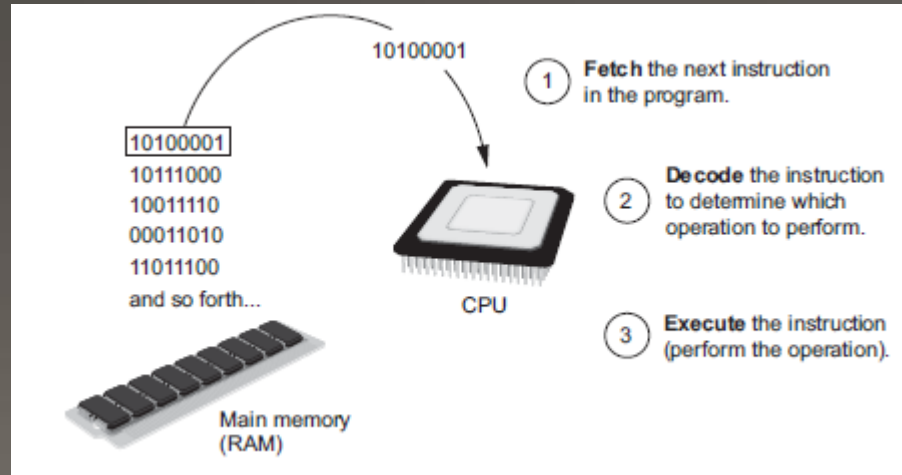| Char	Binary	Char	Binary	Char	Binary
0	0011 0000	O	0100 1111	m	0110 1101
1	0011 0001	P	0101 0000	n	0110 1110
2	0011 0010	Q	0101 0001	o	0110 1111
3	0011 0011	R	0101 0010	p	0111 0000
4	0011 0100	S	0101 0011	q	0111 0001
5	0011 0101	T	0101 0100	r	0111 0010
6	0011 0110	U	0101 0101	s	0111 0011
7	0011 0111	V	0101 0110	t	0111 0100
8	0011 1000	W	0101 0111	u	0111 0101
9	0011 1001	X	0101 1000	v	0111 0110
A	0100 0001	Y	0101 1001	w	0111 0111
B	0100 0010	Z	0101 1010	x	0111 1000
C	0100 0011	a	0110 0001	y	0111 1001
D	0100 0100	b	0110 0010	z	0111 1010
E	0100 0101	c	0110 0011	.	0010 1110
F	0100 0110	d	0110 0100	,	0010 0111
G	0100 0111	e	0110 0101	:	0011 1010
H	0100 1000	f	0110 0110	;	0011 1011
I	0100 1001	g	0110 0111	?	0011 1111
J	0100 1010	h	0110 1000	!	0010 0001
K	0100 1011	I	0110 1001	'	0010 1100
L	0100 1100	j	0110 1010	"	0010 0010
M	0100 1101	k	0110 1011	(	0010 1000
N	0100 1110	l	0110 1100	)	0010 1001
				space	0010 0000

http://www.asciimation.co.nz/

How a Program Works

- The CPU only works with binary instructions and binary information.
- The complete set of instructions for a CPU is the CPU's instruction set.
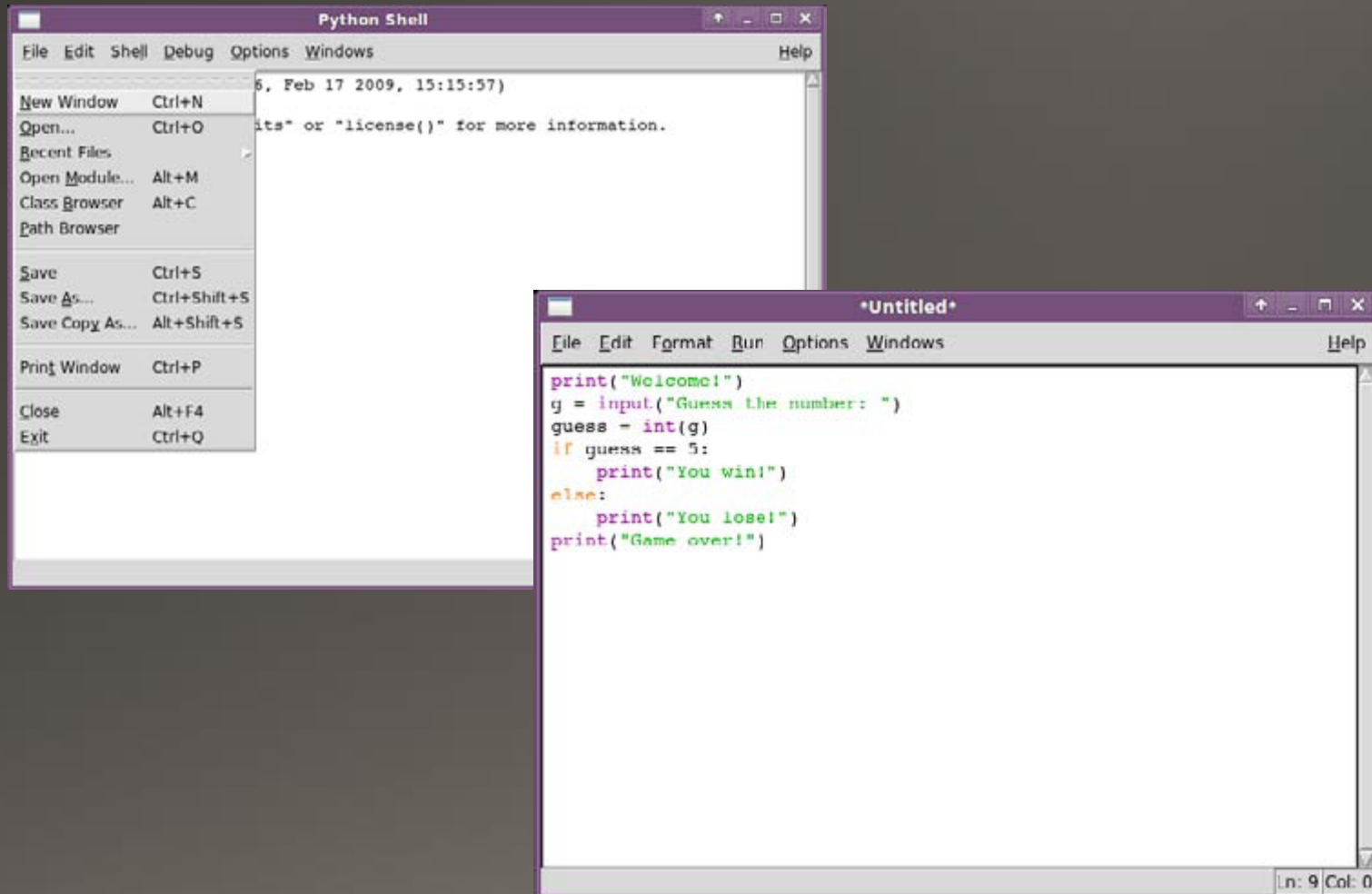

CPU

Fetch-Decode-Execute Cycle

- Fetch – a binary number, representing an instruction, from memory into the CPU

- Decode – the binary number to determine which operation it should perform

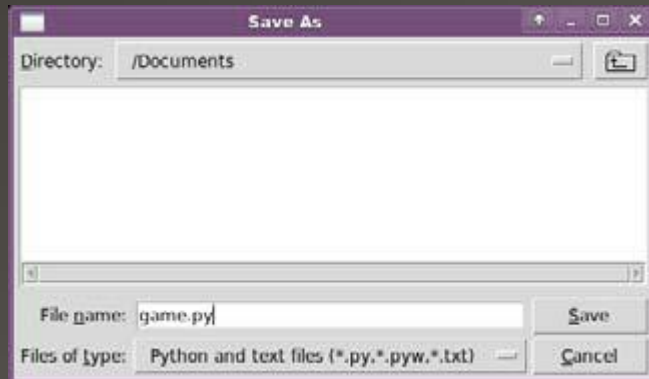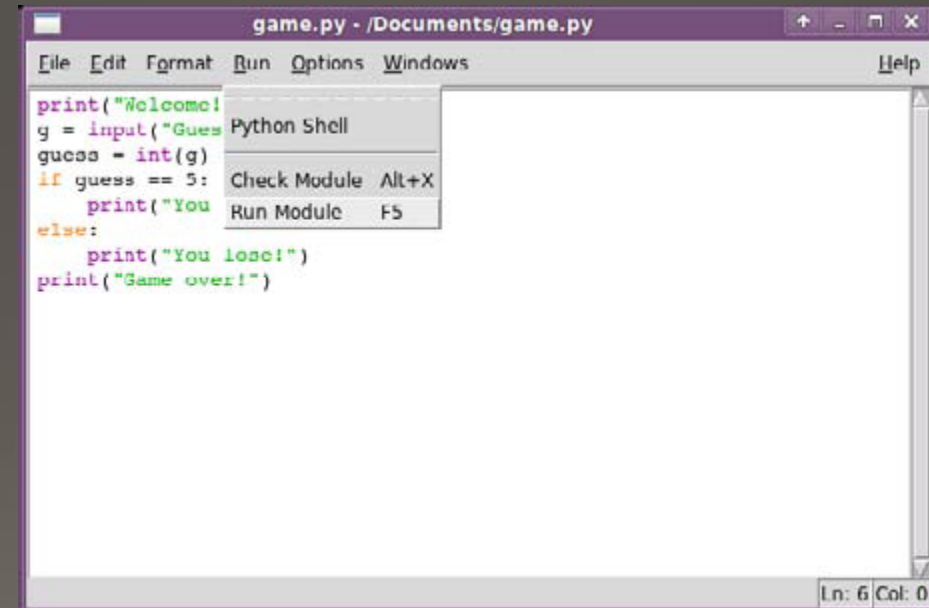- Execute – the operation just decoded

Program File

Python Shell

File Edit Shell Debug Options Windows   Help

```
                          6, Feb 17 2009, 15:15:57)

                          its" or "license()" for more information.
```

New Window	Ctrl+N
Open...	Ctrl+O
Recent Files	
Open Module...	Alt+M
Class Browser	Alt+C
Path Browser	
Save	Ctrl+S
Save As...	Ctrl+Shift+S
Save Copy As...	Alt+Shift+S
Print Window	Ctrl+P
Close	Alt+F4
Exit	Ctrl+Q

Untitled

File Edit Format Run Options Windows   Help

```python
print("Welcome!")
g = input("Guess the number: ")
guess = int(g)
if guess == 5:
    print("You win!")
else:
    print("You lose!")
print("Game over!")
```

Ln: 9 Col: 0
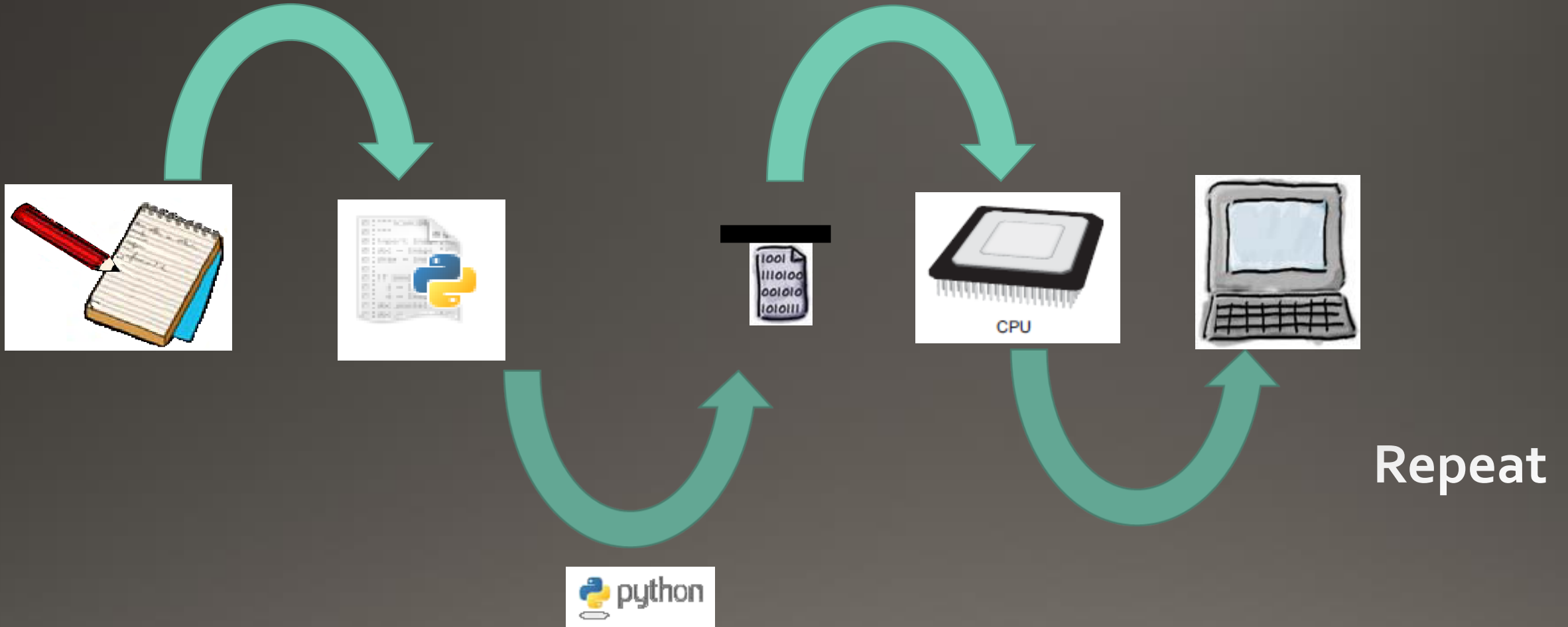
Save and Run the Program

Save it first

Then run it

What Really Happens

Repeat

Interactive Mode

- Also called the Python shell
- Doesn't save your program
- Great for use as a calculator!
- Also great to use to test something before adding it to your program

```
Python 3.1.2 (r312:79149, Mar 20 2010, 22:55:39) [MSC v.1500 64 bit
(AMD64)] on win32
Type "help", "copyright", "credits" or "license"
for more information.
>>>
```
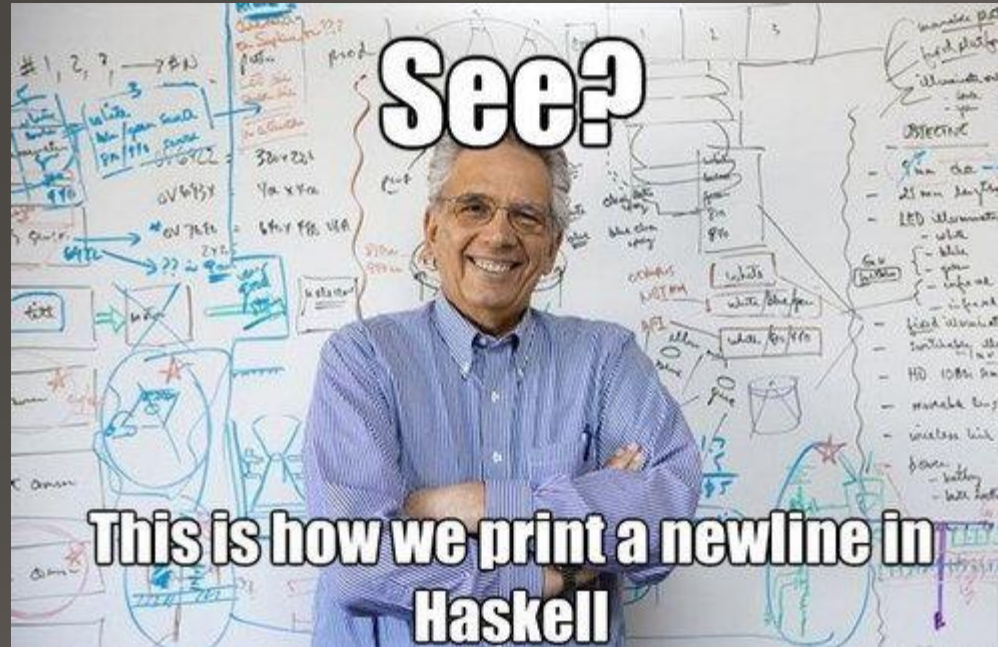
www.python.org

The print statement in IDLE's interactive mode

- print("Hello World!")
- Print your name

Automatic newline?

Add end = '' to remove it: print("Lisa Henderson", end = "")

Practice problems creating a program file using the IDLE programming environment

- Create a program that will print "Hello World!" to the screen
  - Create a new window
  - Type the following:

    print("Hello world!")
  - Save your program and run it
  - Create a program that will print your name
  - Print a smiley face (ascii art)
- Ascimation