CSE 20 11-9-21

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- PA6 Posted
- labs soon
- Holiday Thur 11-11-21
- supplemental lecture. (maybe 2)

Ex. Time.py

use time module

```
import time
time.time() # numer of seconds
            # since the epoch
```

How can we build our own modules?

In general:

import module_name

help(module_name)

Ex. Matrix.py

Represent matrices as a list of lists of numbers.

```
M = [ [1, 2, 3],
      [4, 5, 6],
      [7, 8, 9] ]
```

$\longleftrightarrow$ $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

## Exercise

Write a module called

Vector.py

include functions.

- add() compatible(s)?
- sub()
- negate()
- scalarMult()
- randomVector()
- dot() $(a,b,c)\cdot(d,e,f) = ad+be+cf$
- hadamard() $((a,b,c),(d,e,f)) \rightarrow (ad, be, cf)$
- cross() Vector calculus.
- tenso() $\longrightarrow$ matrix

$$((a,b,c),(d,e,f)) \rightarrow \begin{pmatrix} ad & ae & af \\ bd & be & bf \\ cd & ce & cf \end{pmatrix}$$

Also write

TestVector.py

containing calls to all fcns.

Ex. Module1.py
Module2.py

## Namespaces

In Python a namespace is a collection of identifiers belonging to a module, or function, or other structure (class).

- each module has its own namespace
- each function has its own namespace

files, modules, namespaces

file : prog.py

module : prog

namespace : prog

In Python, one-to-one correspondence

files ↔ modules → namespace

Scope

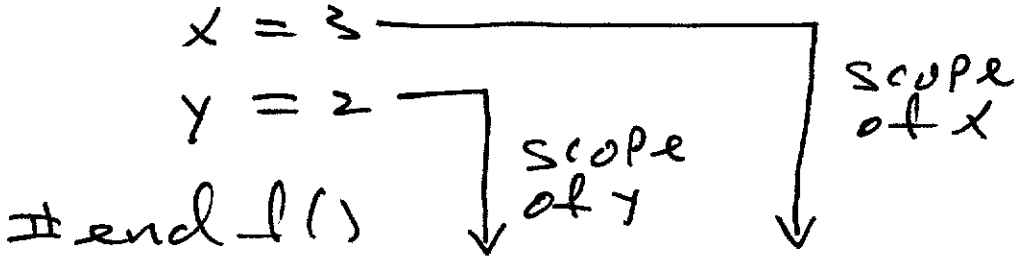
The scope of an identifier is the area of program where it can be accessed.

## 3 main scopes :

### local scope :

within fcn definition

```
def f():
    x = 3
    y = 2
#end f()
```

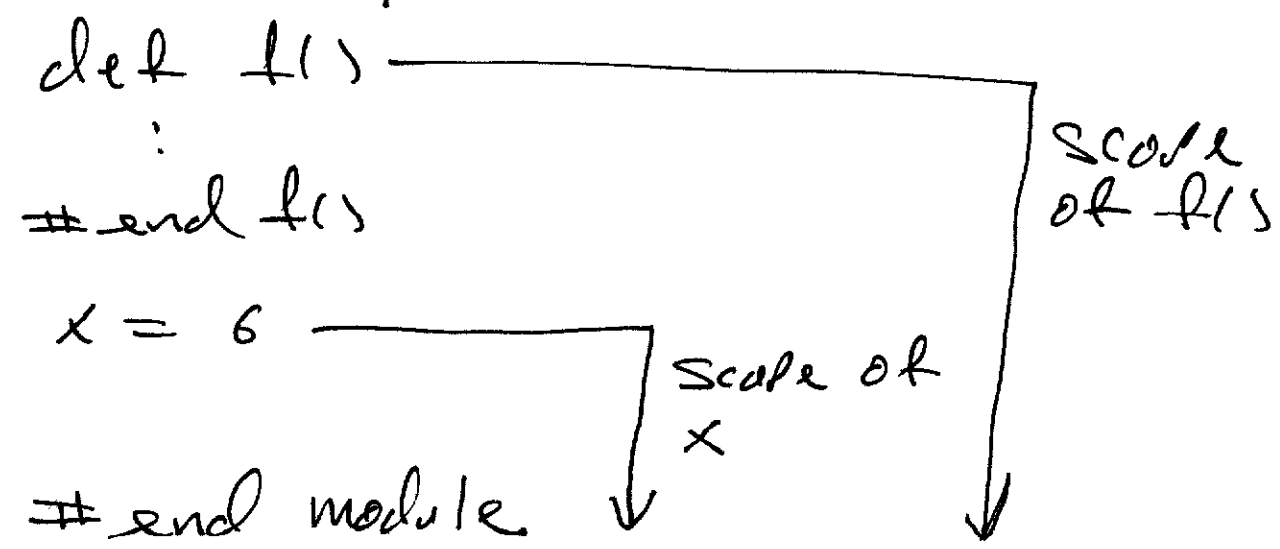



### Global scope

within current module

```
#module.py
def f()
    :
#end f()
x = 6

#end module
```



# Built-in scope

all built-in identifiers

print()
sum()
range()
list()
⋮

Collisions between names: the innermost scope has precedence