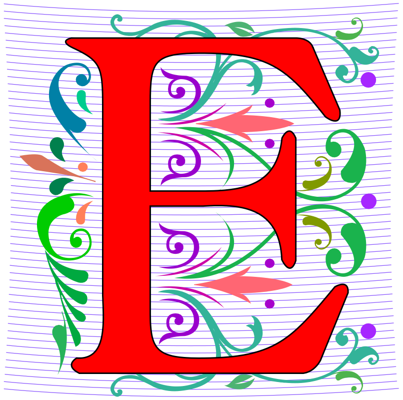
Compsci 101
Selection, Lists, Sequences, Faces

	A	B	Result
A and B	True	True	True
A and B	True	False	False
A and B	False	True	False
A and B	False	False	False
A or B	True	True	True
A or B	True	False	True
A or B	False	True	True
A or B	False	False	False
not A	True		False
not A	False		True

Susan Rodger

January 26, 2023

`E` is for …



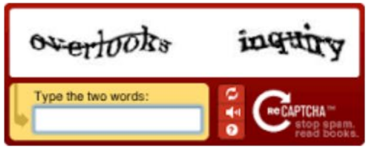
- **Escape Sequence**
  - Why `\n` is newline and `\t` is a tab
- **Encryption**
  - From Caesar Ciphers to SSL (https) and beyond
- **Enumerate**
  - Iterating over data, counting
- **Email**
  - a way to communicate

Luis von Ahn, Guatemalan entrepreneur
Duke BS Math 2000, CMU PhD CS

“I build systems that combine humans and computers to solve large-scale problem that neither can solve alone. I call this Human Computation, but others sometimes call it crowdsourcing.”

"In college, I thought my goal in life was to get a good GPA, but it's equally important to get involved with a good professor doing good research. Take advantage of what's going on around you."

ELIZABETH HOLMES: LA NUEVA ALIADA DEL MAGNATE CARLOS SLIM
Forbes
CENTROAMÉRICA
OCTUBRE / NOVIEMBRE · 2015
10 AUTOS INTELIGENTES
VEHÍCULOS QUE LLEGARON DEL FUTURO
GASODUCTO MÉXICO-CA
LAS VENAS DE LA ENERGÍA DEL ISTMO
UNIVERSIDADES A EXAMEN
HEADHUNTERS DECODIFICAN A LOS EGRESADOS
LUIS VON AHN
EL “PROFESOR” DE BILL GATES
EL FUNDADOR DE DUOLINGO QUIERE ENSEÑAR INGLÉS A TODA LATINOAMÉRICA POR MEDIO DE SU APLICACIÓN, EN LA CUAL APRENDE ESPAÑOL EL MILLONARIO NÚMERO UNO DEL MUNDO. LA EMPRESA DEL GUATEMALTECO YA SE VALÚA EN 500 MDD.
ESTADOS UNIDOS, PANAMÁ Y PUERTO RICO 6.5 DÓLARES
EL SALVADOR 5 DÓLARES / COSTA RICA 3,300 COLONES
HONDURAS 125 LEMPIRAS / GUATEMALA 50 QUETZALES
NICARAGUA 140 CÓRDOBAS



Announcements

- **APT-1 is due tonight!**
  - Run each APT on the APT tester, *1 grace day*
  - Check your grade – click *check submissions*
- **QZ01-05 turned off at 10:15am today!**
  - Be sure to do QZ06 by 10:15am on Thursday!
- **Assignment 1 Faces is out, program due Feb 2**
  - Read the whole thing
  - Assign1 Sakai Quiz – **Due Jan. 31 – no grace day**
- **Lab 2 Friday**
  - **Prelab 2 do before attending lab**
- **Always: Reading and Sakai quiz before next class**

Announcements

QZ01-03 1/28 10:15am
QZ04 1/29 10:15am
QZ05 1/30 10:15am

- **APT-1 is due tonight!**
  - Run each APT on the APT tester, 1 grace day
  - Check your grade – click *check submissions*
- **QZ01-05 turned off at ~~10:15am today!~~** EXTENDED!!!
  - Be sure to do QZ06 by 10:15am on Tuesday!
- **Assignment 1 Faces is out, program due Feb 2**
  - Read the whole thing
  - Assign1 Sakai Quiz – **Due Jan. 31 – no grace day**
- **Lab 2 Friday**
  - **Prelab 2 do before attending lab**
- **Always: Reading and Sakai quiz before next class**

PFTD

- **Finish WOTO from last time**
- **Assignment 1**
- **Strings**
  - Sequence of characters, “CompSci 101”
- **Lists**
  - Heterogenous sequences
- **Sequences**
  - len(…), indexing, and slicing
- **Functions as Parameters**

Go over WOTO-3 from last time

Assignment 1 and Pre-Lab 2

- **Assignment 1 Faces due Feb 2**
- **Sakai Quiz on Assignment 1**
  - Read through assignment 1
  - Take the quiz
  - Can take many times
  - Due Jan 31 (no grace day)!
- **Prelab 02 – before lab**
  - Read Assignment 1 and take its quiz once

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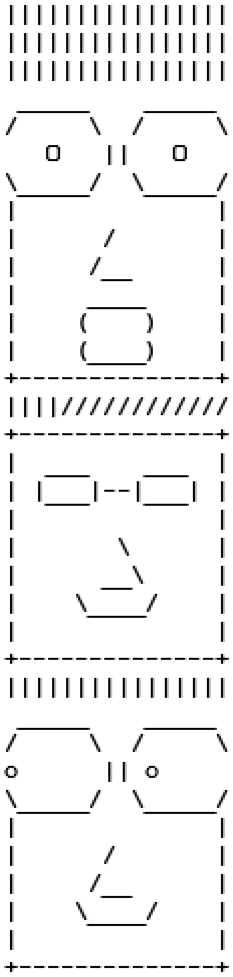
Assignment 1: Faces



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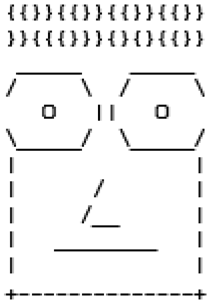

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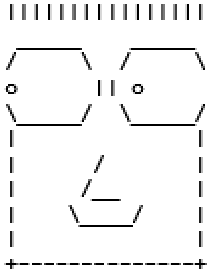

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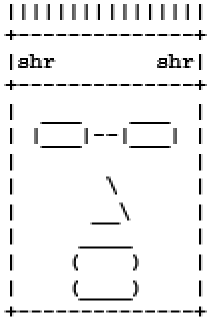

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```

Learning Goals: Faces

- **Understand differences and similarities:**
  - Function definitions vs function calls
  - Functions with return statements vs those without
  - Functions with parameters vs those without
  - Functions can be arguments

- **Be creative and learn lesson(s) about software design and engineering**
  - Create a small, working program, make incremental improvements.
  - Read the directions and understand specifications!

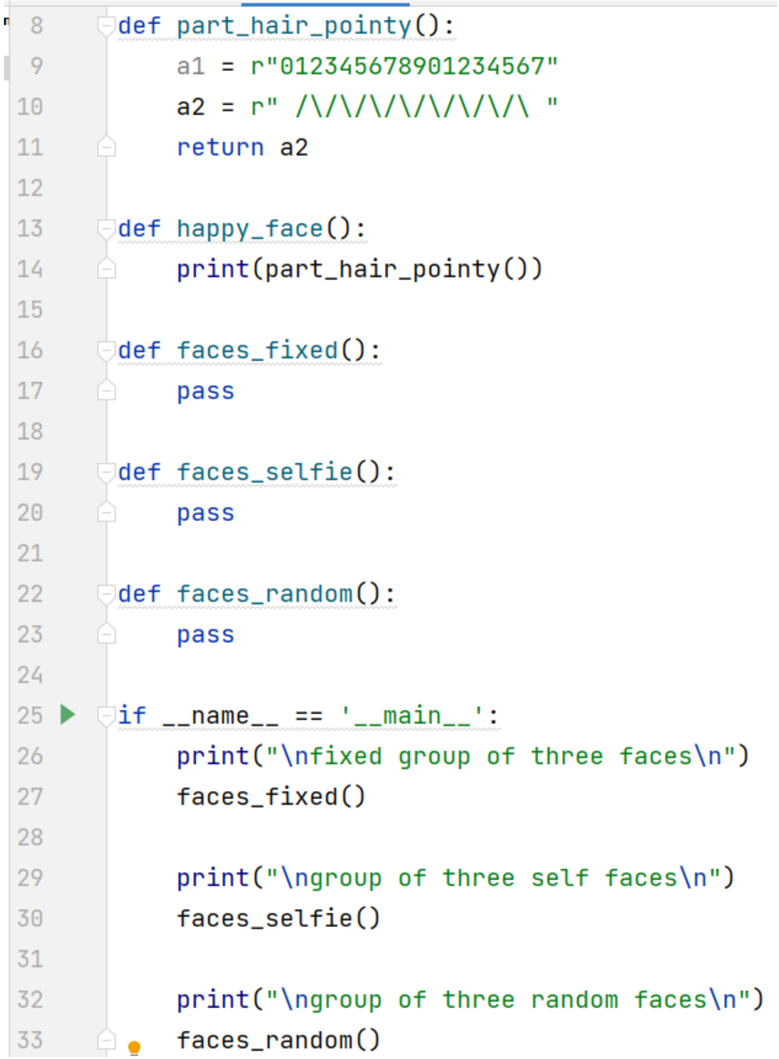
Function Name Format

Function Name Template	Parameters	Returns	Example: Function names
`part_DESCRIPTION`	No parameters	A string	`part_smiling_mouth`
`DESCRIPTION_face`	No parameters	No return value, only prints	`happy_face`
`face_with_DESCRIPTION`	1 or 2 parameters of type function	No return value, only prints	`face_with_mouth`

`faces_DESCRIPTION`	No parameters	No return value, calls face functions	`faces_fixed,`
			`faces_selfie,`
			`faces_random`

`selfie_band, face_random` – helper functions!			

With functions grow by…



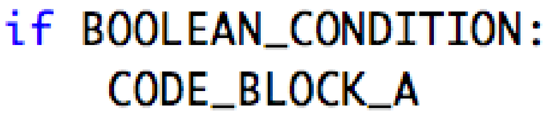
```python
def part_hair_pointy():
    a1 = r"012345678901234567"
    a2 = r" /\/\/\/\/\/\/\/\ "
    return a2

def happy_face():
    print(part_hair_pointy())

def faces_fixed():
    pass

def faces_selfie():
    pass

def faces_random():
    pass

if __name__ == '__main__':
    print("\nfixed group of three faces\n")
    faces_fixed()

    print("\ngroup of three self faces\n")
    faces_selfie()

    print("\ngroup of three random faces\n")
    faces_random()
```

Faces Assignment
What should you do …

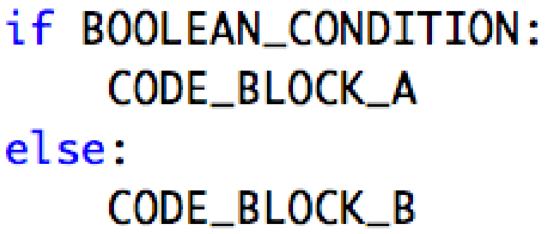
- **Read the assignment**
- **Do the Assignment 1 Sakai quiz**
- **Create project and start writing code (do not need to finish)**

- **Goal: Find your first question about how to do this assignment then ask on Ed Discussion (anonymously) or at consulting/office hours**

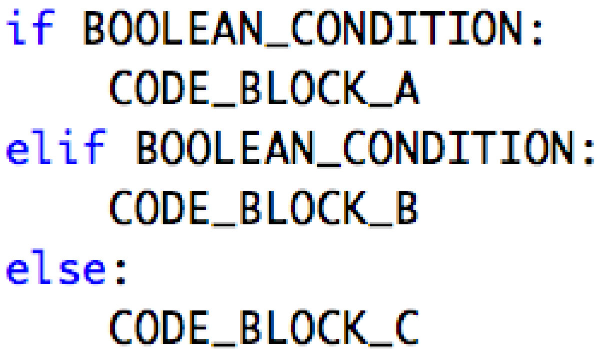
Review Selection Syntax



```
if BOOLEAN_CONDITION:
    CODE_BLOCK_A
```



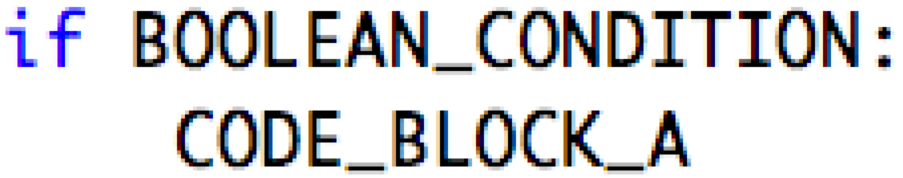
```
if BOOLEAN_CONDITION:
    CODE_BLOCK_A
else:
    CODE_BLOCK_B
```



```
if BOOLEAN_CONDITION:
    CODE_BLOCK_A
elif BOOLEAN_CONDITION:
    CODE_BLOCK_B
else:
    CODE_BLOCK_C
```

- **What is similar and different?**
  - What other variations could work?
  - Could only `elif…else` work?
- **if – required**
- **elif – optional, as many as needed**
- **else – optional, no condition**

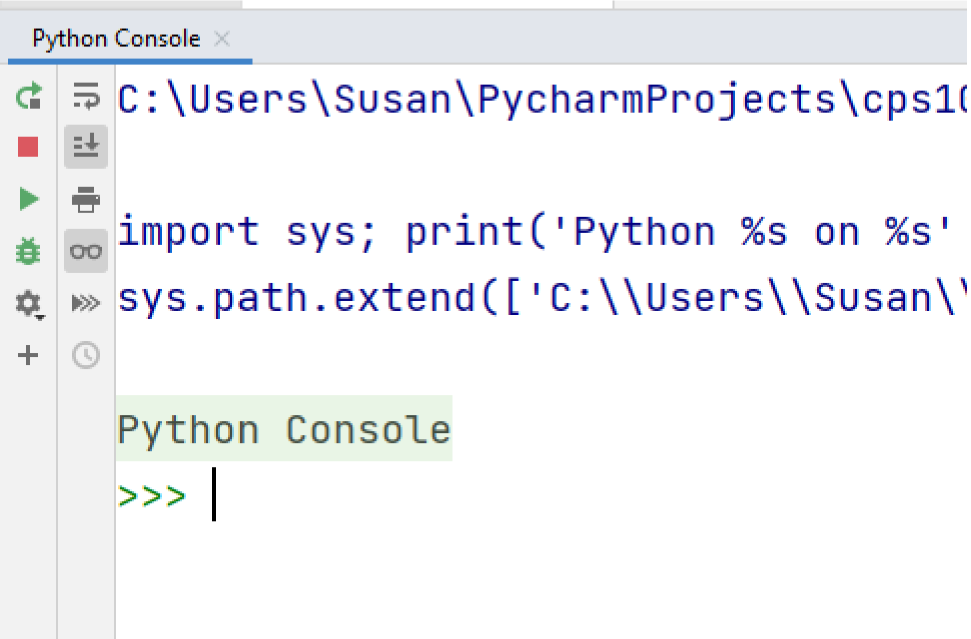
Boolean condition (True/False)



```
if BOOLEAN_CONDITION:
    CODE_BLOCK_A
```

- **See `type(3 < 5)`**
- **Relational operators: `< <= > >= == !=`**
- **Boolean operators: `and or not`**

Console on Booleans

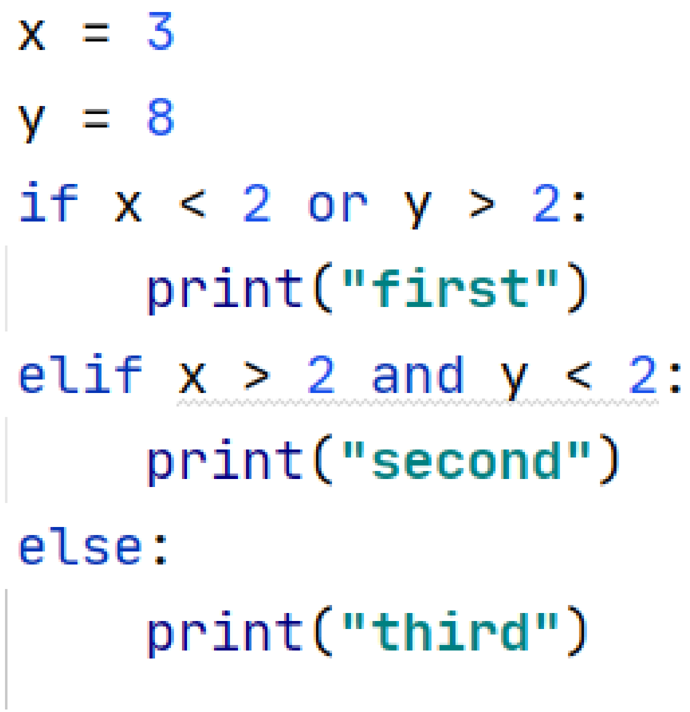


```
C:\Users\Susan\PycharmProjects\cps1(

import sys; print('Python %s on %s'
sys.path.extend(['C:\\Users\\Susan\'

Python Console
>>> 
```

Boolean Operations

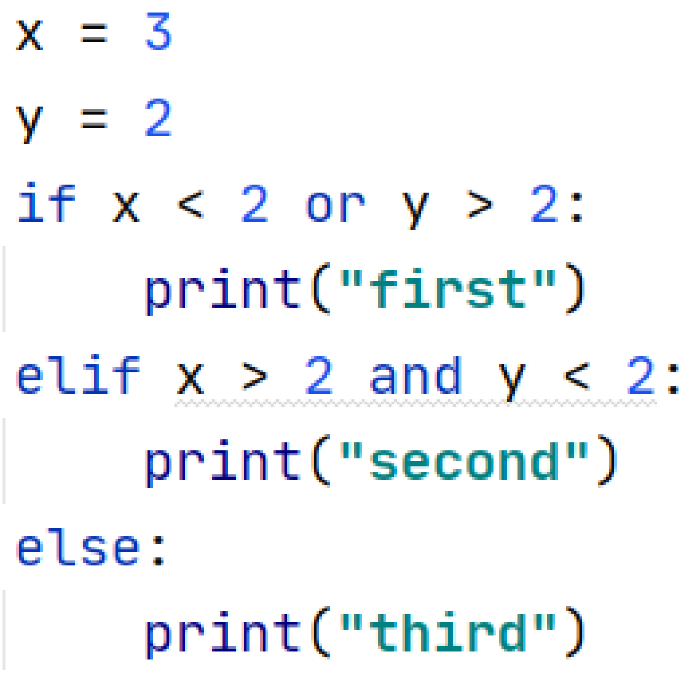
	A	B	Result
A and B	True	True	True
A and B	True	False	False
A and B	False	True	False
A and B	False	False	False
A or B	True	True	True
A or B	True	False	True
A or B	False	True	True
A or B	False	False	False
not A	True		False
not A	False		True

Example with And and Or



```
x = 3
y = 8
if x < 2 or y > 2:
    print("first")
elif x > 2 and y < 2:
    print("second")
else:
    print("third")
```

OUTPUT:



```
x = 3
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if x < 2 or y > 2:
    print("first")
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    print("second")
else:
    print("third")
```
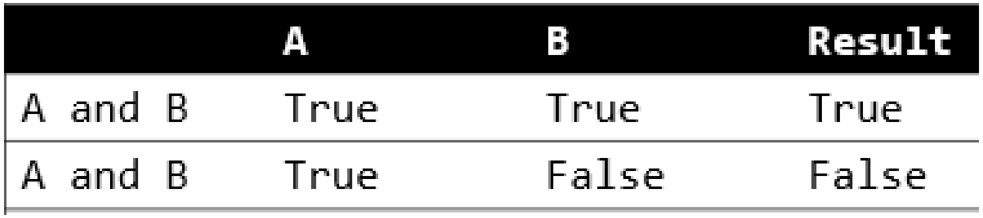

OUTPUT:

WOTO-1 Review Functions and Booleans
http://bit.ly/101s23-0126-1

- **In your groups:**
  - Come to a consensus



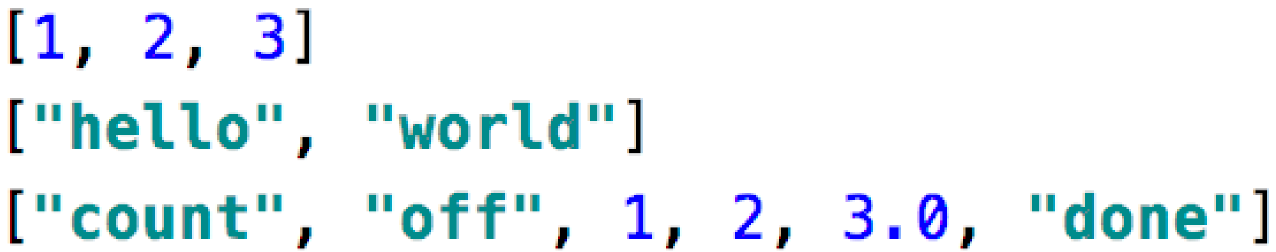
	A	B	Result
A and B	True	True	True
A and B	True	False	False

Strings - indexing

- **x = "chair"**
- **y = "desk"**
- **z = x[2] + y[2] + y[3]**
- **w= len(x)**
- **v = x[len(y)]**
- **t = x[len(x)]**

Lists

- **Syntax: `[ITEM_1, ITEM_2, ITEM_3, …]`**
  - Starts and ends with square brackets: […]
  - Elements in the list are divided by commas “,”
- **Lists can be *heterogenous* sequence**
  - Strings, ints, lists, anything



```
[1, 2, 3]
["hello", "world"]
["count", "off", 1, 2, 3.0, "done"]
```

Python Sequences

- **Types String and List are both sequences**
- **A sequence in Python has**
  - Length - `len(…)`
  - Membership – `in`
  - Indexing and slicing – `[n], [n:m]`
- **Difference:**
  - String is immutable – cannot change
  - List is mutable – can change

`len(…)` for Python Sequences

- **Length – the number of *elements* in a sequence**
- **`len(…)` – returns the length of a sequence**

- **`s="hello world"   l=["hello", "world"]`**
  - What is `len(s)?`
  - `What is len(l)?`

`in` for Python Sequences

- **`in` checks for membership in the sequence**
  - True/False – if `element in seq`

- **`s="hello world"  lst=["hello", "world"]`**
  - What is an element for the string `s`? List `lst`?

  - What is: `'h' in s`?
  - What is: `'h' in lst`?
  - What is: `"hello" in lst`?

Indexing Python Sequences

- **`s="hello world" l=["hello", "world"]`**
- Indexing provides access to individual elements
  - Compare **`s[0]`** and **`l[0]`**
    - Start with 0 offset, what is last valid positive index?
  - Compare **`s[-1]`** and **`l[-1]`**
    - What is negative index of second to last element?
    - Index **`–n`** is the same as index **`len(seq) - n`**

0	1	2	3	4	5	6	7	8	9	10
H	E	L	L	O		W	O	R	L	D
-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

Slicing Python Sequences

- **`s="hello world"`**
- **`lst=["my", "big", "beautiful", "world"]`**
- Slicing provides sub-sequence (string or list)
  - `seq[n:m]` – all elements `i`, s.t. `n <= i < m`
  - Compare **`s[0:2]`** and **`lst[0:2]`**
    - **`s[0:2] is`**
    - **`lst[0:2] is`**
  - What is length of subsequence? **`len(lst[1:3])`**
    - **`lst[1:3] is`**
    - **`len(lst[1:3]) is`**

WOTO-2 Sequence Length Indexing http://bit.ly/101s23-0126-2

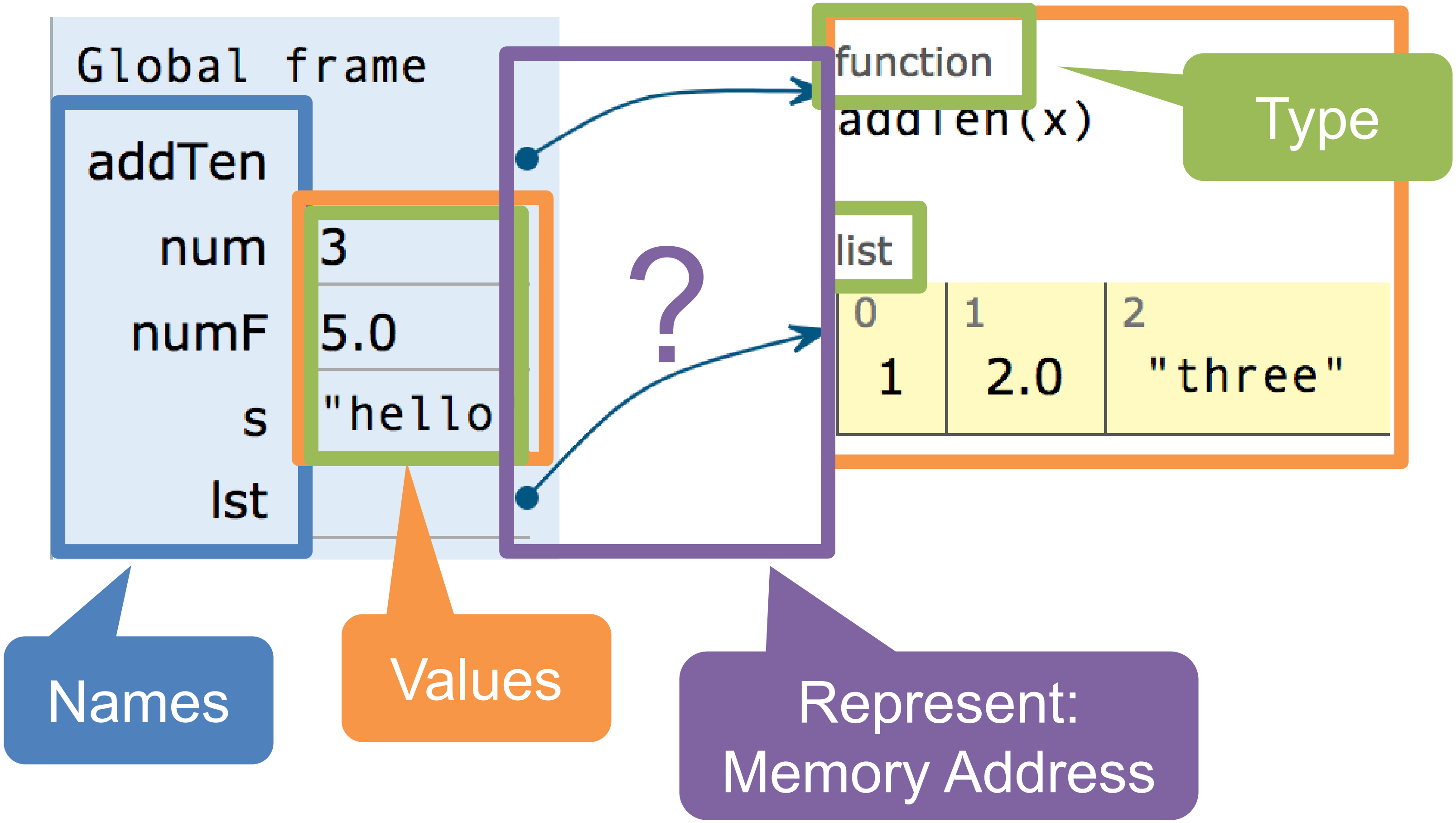
- **In your groups:**
  - Come to a consensus

Learning Goals: Faces

- **Understand differences and similarities:**
  - Function definitions vs function calls
  - Functions with return statements vs those without
  - Functions with parameters vs those without
  - ➡ Functions can be arguments

- **Be creative and learn lesson(s) about software design and engineering**
  - Create a small, working program, make incremental improvements.
  - Read the directions and understand specifications!

Name vs Value vs Type



Type

Names

Values

Represent:
Memory Address