

# Discussion 01

## Control, Environment Diagrams

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# Announcements

- Last chance to change sections on [sections.cs61a.org](https://sections.cs61a.org) is 11:59pm Wed 9/14.
- Request to change to CS 10 at 2pm on Wed 8/31 (on Ed).
- Lab 1 is due 11:59pm Wednesday 8/31.
- Homework 1 is due 11:59pm Thursday 9/1.
- Lots of office hours are available to help you.
- Zoom access ([go.cs61a.org/lecturezoom](https://go.cs61a.org/lecturezoom)) to live lecture will be offered all semester.

**All Slides can be found on**  
**[teaching.aditbala.com](https://teaching.aditbala.com)**

# Control



# Booleans

Falsey	Truthy
False	True
None	Everything else
0	
[], "", (), {}	

# Boolean Operators

- `not <conditional expression>`
  - returns opposite of `<conditional expression>`
  - `not (1 == 2) -> True`
- `<conditional expression> or <conditional expression>`
  - returns the first **Truthy** value it finds, `False` if none
  - `0 or None or 1 -> 1`
- `<conditional expression> and <conditional expression>`
  - return first **Falsy** value, or last value if everything is true
  - `40 and 0 and True -> 0`
  - `40 and 1 and True -> True`

# Short Circuiting

- Sort of like making an assumption
  - If I'm broke, then I don't need to check the price of boba since I'll never be able to buy it lol 😬
- `and` will stop at the first **Falsey** value and return it
- `or` will stop at the first **Truthy** value and return it
- Why is this important?
  - May not need to evaluate all expressions. Even if there is an expression that errors, e.g. `1/0`, `and` / `or` expression might short circuit before it reaches error

# Boolean Examples

- `0 or 435 or False`
  - returns `435`
- `True and "Hello" and 0`
  - returns `0`
- Short Circuiting
- `3 and 1/0 and False`
  - returns `Error`
- `3 and False and 1/0`
  - returns `False`



# If Statements

- How to use `<conditional expressions>` to execute/skip lines of code?

```
if <conditional expression>:  
    <suite of statements>  
elif <conditional expression>:  
    <suite of statements>  
else:  
    <suite of statements>
```

- Colons after `if`, `elif`, `else` statements
- `else` doesn't need `<conditional expression>`

# If Statements Example

```
wallet = 0

if wallet > 0:
    print('you are not broke')
else:
    print('you are broke')
if wallet == 0:
    print(0)
```

# If Statements Example

```
wallet = 0

if wallet > 0:
    print('you are not broke')
else:
    print('you are broke')
if wallet == 0:
    print(0)
```

```
you are broke
0
```

# General Tips for Approaching Problems

- Do not immediately start coding
  - Ensure you understand the problem
  - Have an idea of what you want to code
- Groupwork
  - Bounce ideas off of each other!
  - Share any ideas, questions, or misconceptions
- Reading the problem
  - Please read the entire problem
  - Hints are very useful
  - Doctests are SUPER useful

# Worksheet

# While Loops

- How to execute a statement multiple times in a program?

```
while <conditional clause>:  
    <statements body>
```

- program executes until `<conditional clause>` is false
- In other words, only run when `<conditional clause>` evaluates to `true`

# While Loop Examples

```
x = 3
while x > 0:
    print(x)
    x -= 1
```

# While Loop Example

```
x = 3
while x > 0:
    print(x)
    x -= 1
# x = x - 1
```

```
3
2
1
```



# While Loop Example

- What is wrong with this while loop

```
x = 3
while x > 0:
    print(x)
```

- This will result in an infinite loop
- Make sure you are modifying the condition in the while loop

# Enviroment Diagrams



# Enviroment Diagrams

- What are they?
  - A way to model how our program runs line by line
  - Keep track of variables, function calls and what they return, etc.
- Why use them?
  - Can help us understand where there is a bug in program (debugging)
  - Useful for other questions (WWPD, coding)
  - Exam points!

# Important Concepts

- Expressions
  - Evaluate to values
  - $1 + 1 \rightarrow 2$
- Assignment Statements
  - Bind (left side) **names** to (right side) **values**
  - **Names**
    - variable names
  - **Values**
    - Evaluate right side before binding
  - $x = 2 * 2$
  - $x \rightarrow 4$
  - doesn't return anything

# Frames

- Global Frame always exists
- Frames list the bindings of variables and their corresponding value
- Used to look up the value of a variable

# Question 7: Assignment Diagram

```
x = 11 % 4  
y = x  
x **= 2
```

# def statements

- `def` statements are used to bind **function objects** to a **variable**
- Only bind, **NO** execution until function is called
  - `def foo():` -> define function called `foo` with no parameters
  - `foo()` -> execute `foo`
- Binding name is function name
- Parent function is frame where function is defined
- Keep track of *name, parameters, parent frame*

Python 3.6  
([known limitations](#))

```
1 x = 3
→ 2 def square(x):
3     return x ** 2
```

[Edit this code](#)

Frames      Objects

Frames	Objects
Global frame	
x   3	
square	func square(x) [parent=Global]

The diagram illustrates the state of memory. On the left, under 'Frames', is a 'Global frame' containing a variable 'x' with the value 3 and a variable 'square'. On the right, under 'Objects', is a function object 'func square(x) [parent=Global]'. A blue arrow points from the 'square' variable in the 'Global frame' to the function object, indicating that the variable 'square' is bound to the function object.

# Worksheet



# Thank you!

**Attendance (linked on website) ->**  
**[teaching.aditbala.com](https://teaching.aditbala.com)**

**Anon Feedback -> <https://tinyurl.com/adit-anon>**