Lecture 1: Introduction

June 22nd, 2020


Welcome to CS 61A!

CS61A

- 720 students
- 16 timezones

Humans of CS 61A

Instructors

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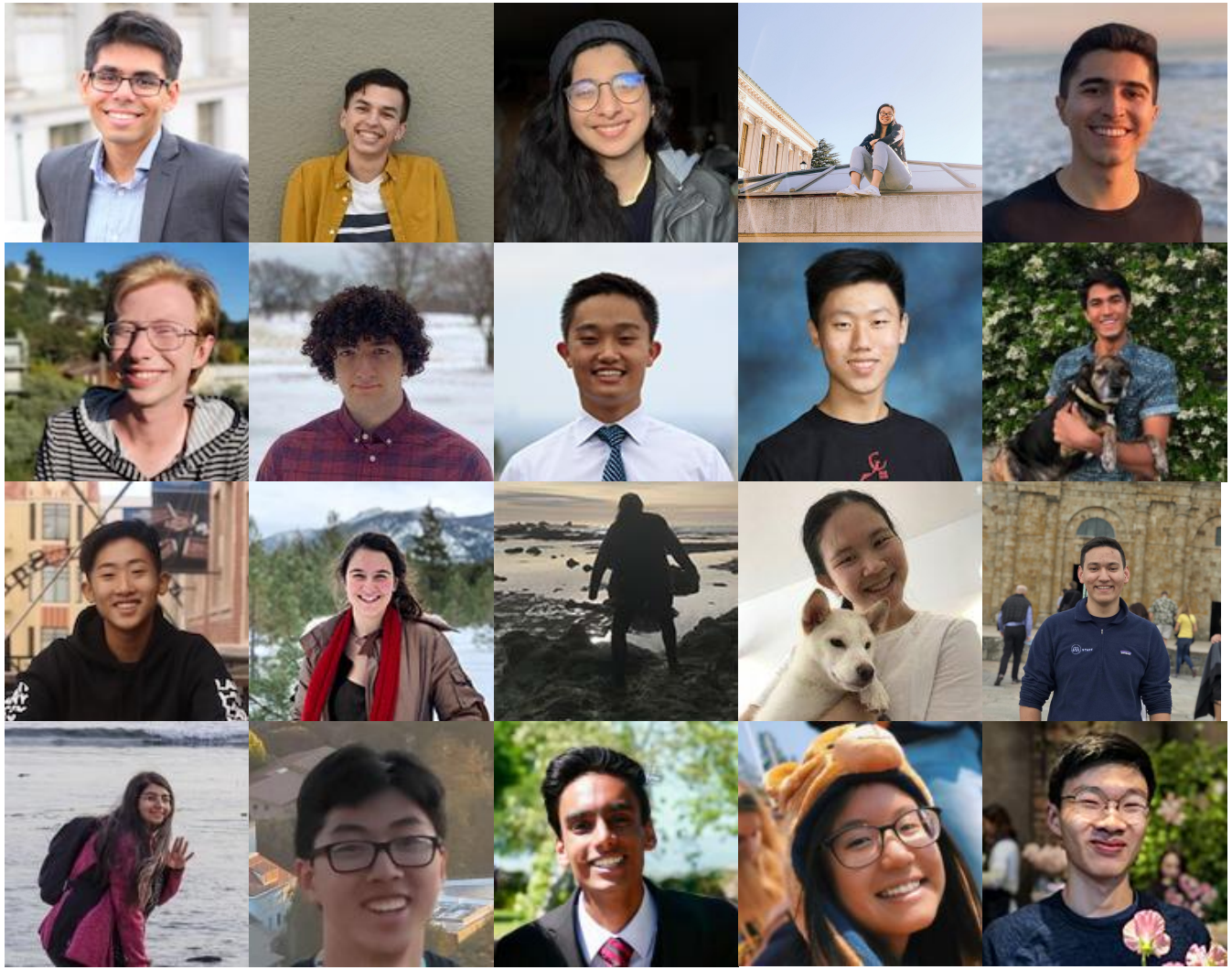
Teaching Assistants



Tutors

You!

Computer Science

What is Computer Science?

- What problems can be solved using computation?
- How do we solve those problems using computers?
- What techniques lead to effective solutions?

Systems

Artificial Intelligence

Graphics

Security

Networking

Programming Languages

Theory

...

What is CS 61A?

- A course about managing complexity
  - Mastering abstraction
  - Programming paradigms

- An introduction to programming
  - Full understanding of Python fundamentals
  - Combining multiple ideas in large projects
  - How computers interpret programming languages

- A challenging course that will demand a lot of you

Alternatives to CS 61A

CS 10 The Beauty and Joy of Computing

An introduction to fundamentals (& Python) that sets students up for success in CS 61A

cs10.org

Data 8 The Foundations of Data Science

Fundamentals of computing, statistical inference, & machine learning applied to real-world data sets

data8.org

Course Logistics

Course Format

Lecture	Whenever you want!
Lab	the most important part of this course
Discussion	the most important part of this course
Office hours	the most important part of this course
Tutoring	the most important part of this course
Textbook	composingprograms.com

- 8 programming **homeworks**
- 4 programming **projects**
- 1 **diagnostic quiz**, 1 **midterm exam,** and 1 **final exam**
- Lots of course support and a great community

The First Week

- Lab 0 released today!
- Discussion starts tomorrow!
- OH starts later this week

Lecture

- Main lectures are recorded videos by John Denero
- We will be giving supplementary live lectures once a week (details announced later)

Discussion Section

- Only part of the course that tracks attendance
- 90 minute section twice a week
- Largely worksheet based (but do not expect to finish it)
- Recorded

Office Hours

- Three formats: Appointments, Parties, and Instructor
- Appointment-based Office Hours:
  - 20 minutes each
  - Sign up the night before
  - Some will only be conceptual
- Parties:
  - 3 hours each
  - 2 flavors: Homework and Project
  - Queue-based
- Instructor:
  - Strong focus on concepts and not assignments

Small Group Tutoring Sections

Small-group sections (4-5 students) centered around a worksheet which reviews content from the corresponding discussion

Recurring

- Meet twice a week regularly with the same group of students
- Sign-ups will open later this week
- Start next week

Drop In

- Can sign up if you feel like you could use some extra reinforcement on topics presented from the last discussion
- Sign-ups will open every end of the week

Tools

Zoom: A platform for video calls

- Can ask questions via voice or text-chat
- Option to ask questions individually in a “breakout” section
- Where discussions , hw/project parties will happen

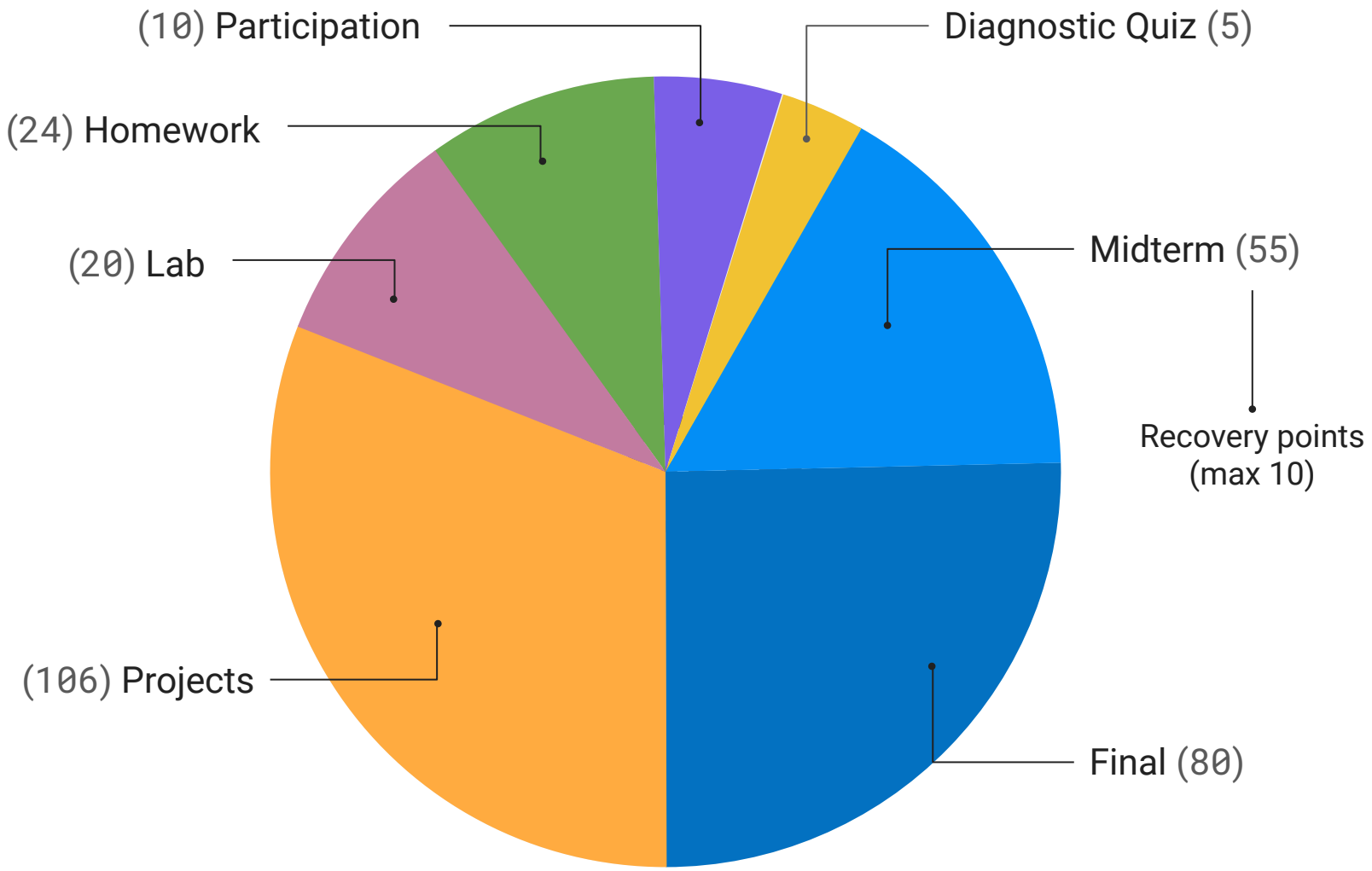
Piazza

- Forum for students to post questions & get announcements from instructors

Various pieces of software

- Will introduce most of these in lab00, so complete this ASAP!

Grading


(10) Participation
Diagnostic Quiz (5)
(24) Homework
(20) Lab
Midterm (55)
Recovery points
(max 10)
(106) Projects
Final (80)

Assignments

You can earn **150 points** through assignments:

- (10) 2 pt. Twice a week lab assignments
- (8) 3 pt. weekly programming homework assignments
- (4) 20-30 pt. programming projects

Most assignments are submitted using Ok (okpy.org).

You must have an @berkeley.edu address listed as your primary email on CalCentral to be enrolled on Ok.

If you have not been added to OK--which you'll find out when you do your assignments--fill out the form on Piazza / email your TA ASAP

Lab Assignments

- Generally released Mon/Wed, due Wed/Fri respectively
- Graded on correct completion, all or nothing
- Lowest two lab grades dropped
- You will complete these on your own time - however, you may find that it is helpful to work on labs during office hours to get support
- More details: https://cs61a.org/articles/about.html#labs

Homework Assignments

- Generally released on Wed, due next Tues
- Graded on correctness, partial credit with every incorrect answer losing you one point on the homework (up till 0)
- **Homework Recovery**:
  - Can recovery one incorrect question per homework by going through one of hw recovery processes
    - Homework recovery session
    - Appointment based office hour
- More details: https://cs61a.org/articles/about.html#homework

Participation

Discussion Participation

- This is part of 300 points.
- You can earn up to **10 participation points**.

Class Participation

- This is **not** part of 300 points.
- Can be used for exam recovery
- Each of the following opportunities is worth 1 class participation credit:
  - Weekly student survey (~8 possible)
  - Extra discussion section attendance (after the initial 10, 2 possible)
  - Extra lab assignment submission (after the initial 10, 2 possible)

EPA (Efforts, Participation, Altruism)

- Extra credit(s); not part of 300 points.
- Can be earned through (but not limited to):
  - Effort = {Office hours, doing every single lab, hw, reading Piazza pages, etc.}
  - Participation = {Raising hand in discussion, asking Piazza questions, etc.}
  - Altruism = {Helping other students, answering Piazza or Office Hour questions etc.}
- Scoring will remain confidential.

Exams

Diagnostic Quiz (5 pts)
When: Thursday, July 2 @ TBA
Format: 60-90 minute electronic exam

Midterm (55 pts)
When: Thursday, July 16 @ TBA
Format: 180 minute electronic exam

Final exam (80 pts)
When: Thursday, August 13 @ TBA
Format: 180 minute electronic exam

Exam recovery
After getting >5 of class participation points,
10 credits can be used toward exam recovery points for the Midterm

Alternates
We will have alternates for each exam at a 12h offset. Fill out http://links.cs61a.org/alt

Collaboration

- This course is not curved -- collaboration, not competition, is key
- Asking questions and discussing ideas is highly encouraged
- **The only students with whom you can share code are**
  - **Your project partner**
  - **Students who have finished the problem you are working on**
- More info: https://cs61a.org/articles/about.html#academic-honesty

Course Overview

Every week will center around a theme with a specific set of goals.

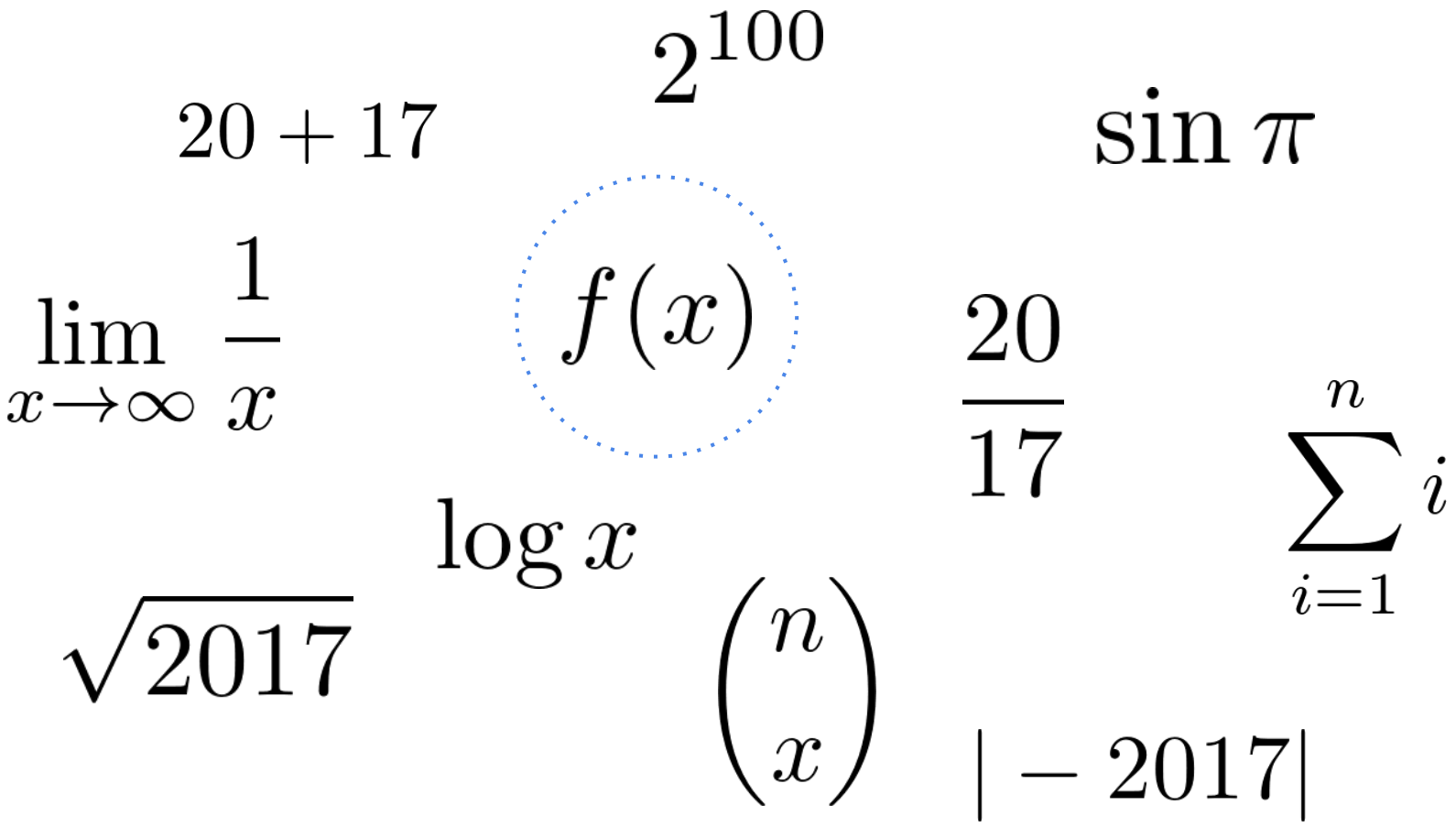
- Learn the fundamentals of programming
- Become comfortable with Python

Expressions

What's in a program?

- Programs work by manipulating **values**
- **Expressions** in programs evaluate to values
  - **Primitive expressions** evaluate directly to values with minimal work needed
- **Operators** combine primitives expressions into more complex expressions
- The Python interpreter evaluates expressions and displays their values

Demo

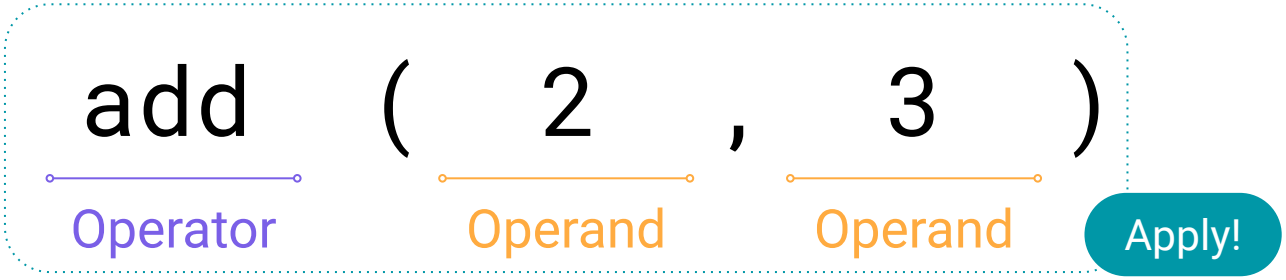


An **expression** describes a computation and evaluates to a value.

Call Expressions

Evaluation procedure for **call expressions**

1. Evaluate the **operator**
2. Evaluate the **operands** from left to right
3. **Apply** the operator (a **function**) to the evaluated operands (**arguments**)



Operators and operands are also expressions

So they also *evaluate to values*

```
add(add(6, mul(4, 6)), mul(3, 5))
```

???

Nested Call Expressions

- Humans evaluate inside-out

```
add(add(6, mul(4, 6)), mul(3, 5))
add(add(6,    24    ), mul(3, 5))
add(add(6,    24    ), mul(3, 5))
add(       30        , mul(3, 5))
add(       30        , mul(3, 5))
add(       30        ,    15    )
add(       30        ,    15    )
                  45
```

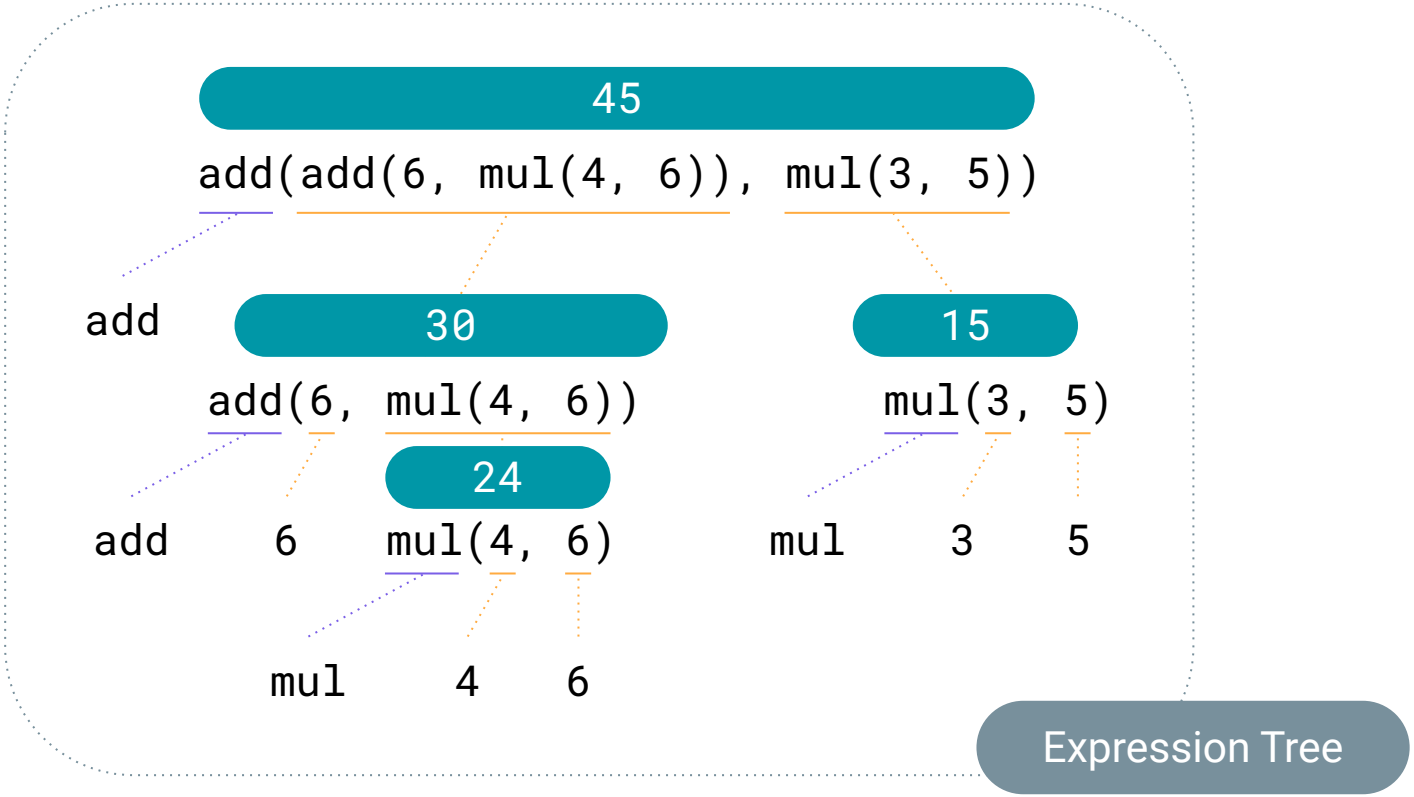
- We can jump ahead or skip around, but Python can't do that!
- How does the computer know which call to evaluate first?

Nested Call Expressions

1 Evaluate operator

2 Evaluate operands

3 Apply!



Demo

Functions, Objects, & Interpreters