

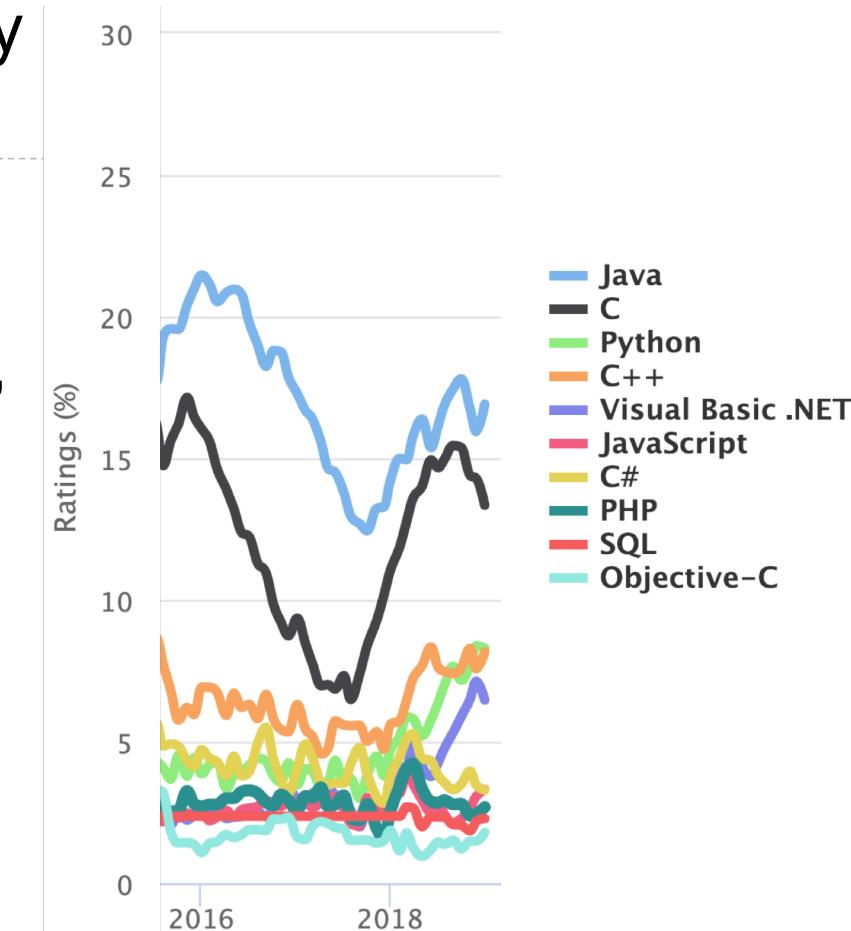
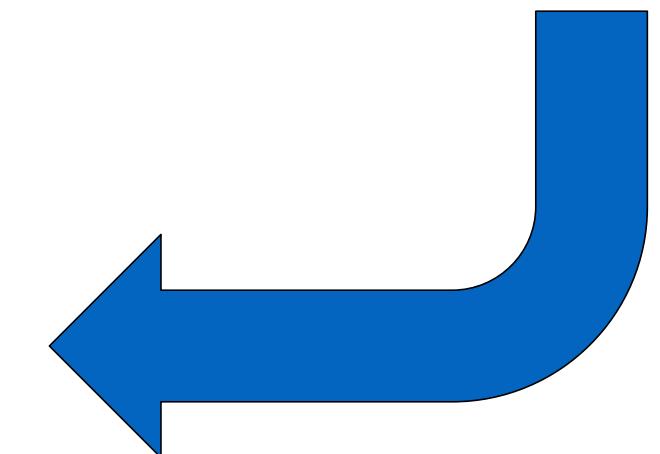
UC Berkeley's CS61A – Lecture 01 – Functions

Python is TIOBE's programming language of the year 2018!

www.tiobe.com/tiobe-index

"The Python programming language has won the title "programming language of the year"! Python has received this title because it has gained most ranking points in 2018 if compared to all other languages. The Python language has won 3.62%, followed by Visual Basic .NET and Java. Python has now definitely become part of the big programming languages. For almost 20 years, C, C++ and Java are consistently in the top 3, far ahead of the rest of the pack. Python is joining these 3 languages now. **It is the most frequently taught first language at universities nowadays**, it is number one in the statistical domain, number one in AI programming, number one in scripting and number one in writing system tests. Besides this, Python is also leading in web programming and scientific computing (just to name some other domains)." **In summary, Python is everywhere.**

**Computing
in the news**



I stand on the shoulders of giants, literally!

- **John Denero** and a superstar team of TAs helped build this course to what it is, transitioning the course from Scheme to Python but preserving all that made it great!
- Was awarded the campus Distinguished Teaching Award for it!



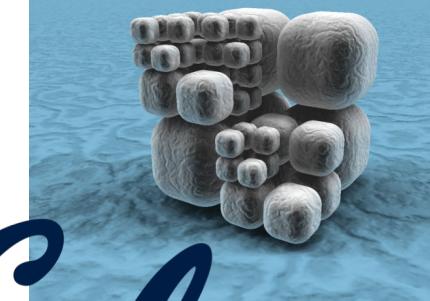
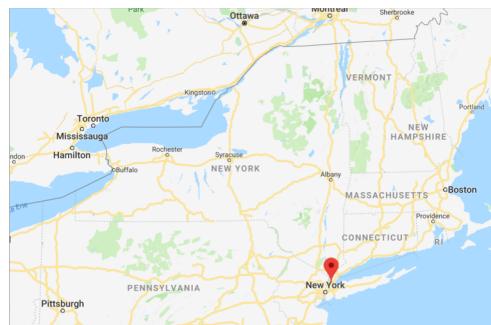
Welcome to CS 61A!

Dan Garcia

ddgarcia@berkeley.edu

Office hours in 777 Soda:

11am–noon Friday
...or by appt



Fastest way to get answers: piazza.com/berkeley/spring2019/cs61a

Contact Head TAs: cs61a@berkeley.edu

The 61A Community

49 teaching assistants (TAs), formally known at Berkeley as GSIs or UGSIs:

- Teach lab & discussion sections
- Hold drop-in office hours
- Lots of other stuff: develop assignments, grade exams, etc.

49 mentors/tutors:

- Teach mentoring sections
- Hold drop-in office hours
- Lots of other stuff: homework parties, mastery sections, etc.

250+ academic interns help answer individual questions & check your progress

1,250+ fellow students make CS 61A unique

Parts of the Course

Lecture: Each live lecture will be filmed and put online a few hrs after – watch that day!

Lab section: The most important part of this course (*next week*)

Discussion section: The most important part of this course (*this week*)

Staff office hours: The most important part of this course (*next week*)

Online textbook: <http://composingprograms.com>

Weekly homework assignments, three exams, & four programming projects

Lots of optional special events to help you complete all this work

Everything is posted to cs61a.org

An Introduction to Computer Science

What is Computer Science?

The study of

- ...
 - What problems can be solved using computation,
 - How to solve those problems, and
 - What techniques lead to effective solutions

Creativity!

Systems

Artificial Intelligence ... Decision Making

Graphics

Robotics

Security

Natural Language Processing

Answering Questions

Networking

Programming Languages

...

Translation

Theory

Scientific Computing

...

What is This Course About?

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

Different types of languages: Scheme & SQL

A challenging course that will demand a lot of you



λ



Hard Fun

Alternatives to CS 61A

CS 10: The Beauty and Joy of Computing

Designed for students without prior experience

A programming environment created by Berkeley,
now used in courses around the world and online

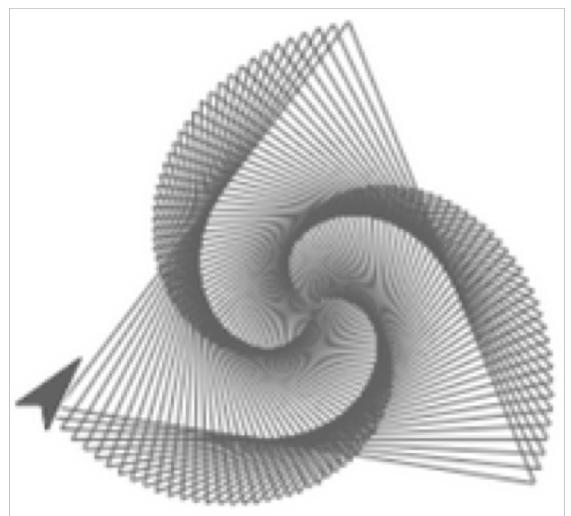
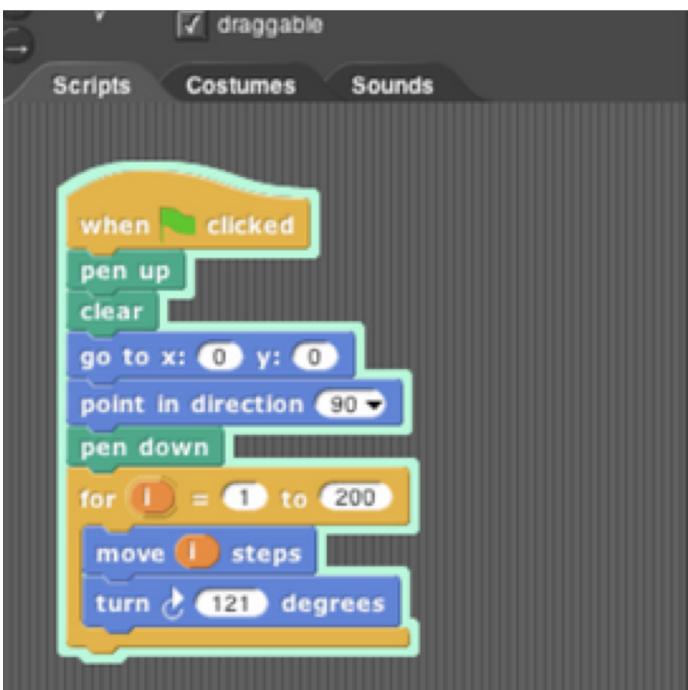
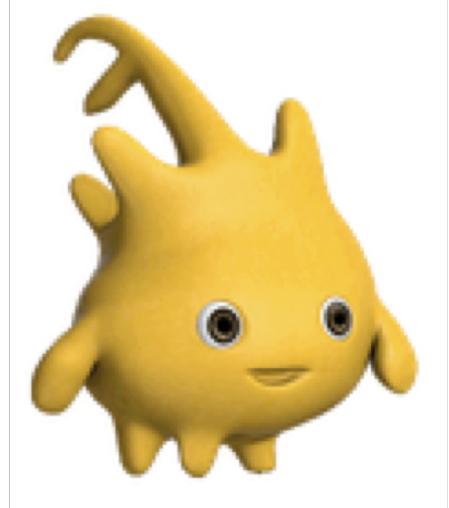
An introduction to fundamentals (& Python)
that sets students up for success in CS 61A

Spring 2019: **Dan Garcia**

100+ seats available

More info: <http://cs10.org/>

If you have no experience, we STRONGLY encourage
you to enroll in both classes, then after the
first exams for each classes on 2/11, decide
which one you want and drop the other one.



Data Science 8: Foundations of Data Science

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

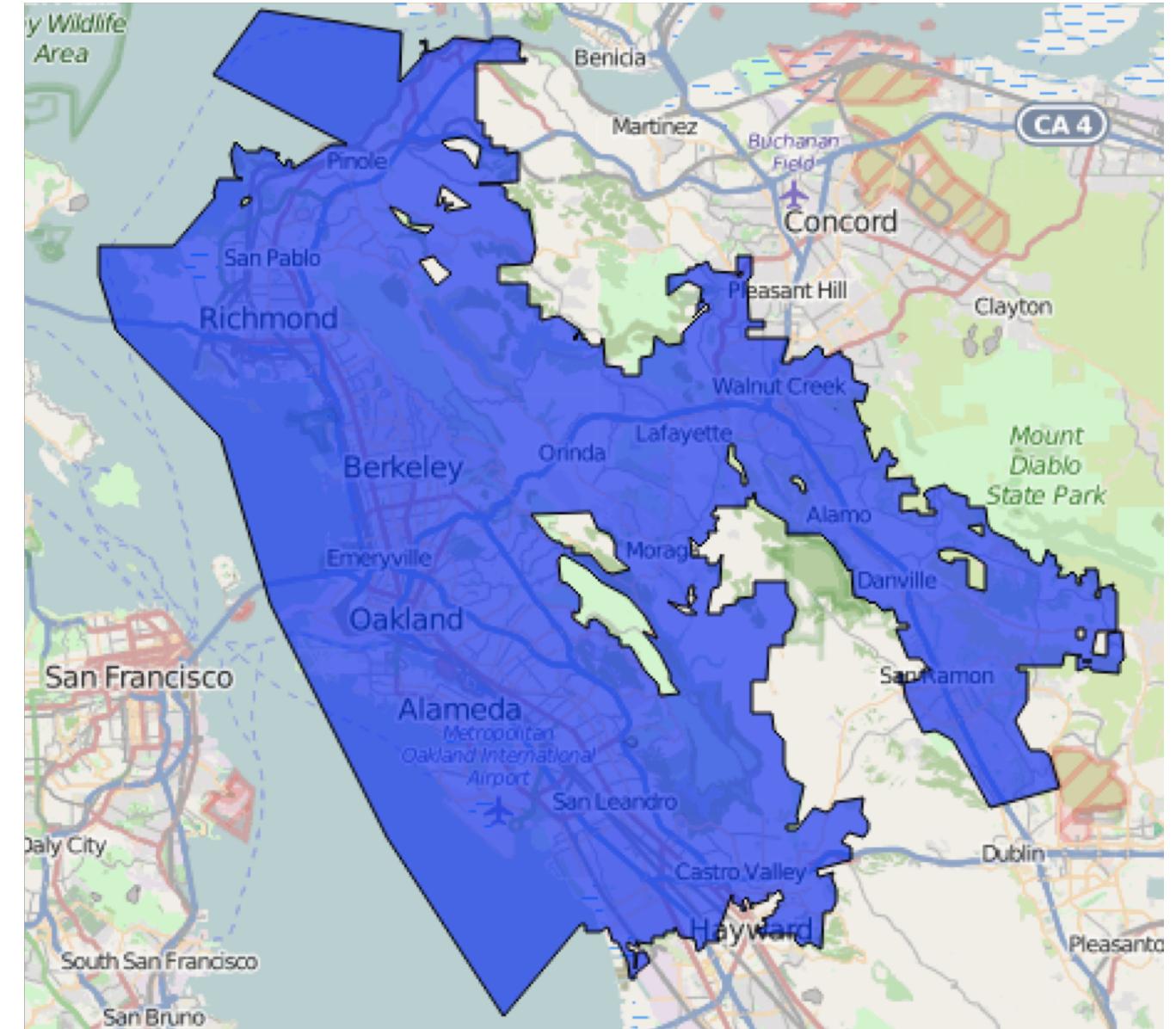
More statistics than computer science

Great programming practice for CS 61A

Listed as CS C8

147+ person waitlist

More info: <http://data8.org/>



Course Policies

Uncool

- You don't know that?
Sheesh! (rolls eyes)
- Elitism
- "Me first" attitude
- Making students feel unwelcome

Learning Community Course Staff

Cool

- You having trouble?
Here, let me help!
- Supporting each other
- "We together" attitude
- Making students feel welcome. We are a CS61A family!

Details...

<http://cs61a.org/articles/about.html>

Collaboration

Asking questions is highly encouraged

- Discuss everything with each other; learn from your fellow students!
- Some projects can be completed with a partner
- Choose a partner from your discussion section

The limits of collaboration

- One simple rule: Don't share your code, except with your project partner
- Copying project solutions causes people to fail the course
- We really do catch people who violate the rules, because...
 - We also know how to search the web for solutions
 - We use computers to check your work

Build good habits now

Innovations brought from CS10 to CS61A

Computing in the News

- We'll bring relevant social implications of computing topics into the course!

Three slip days for projects (not for homework, which are graded on effort)

- You have three slip day "virtual tokens" used to give you more time for projects. Use them all at once to extend a deadline by 3 days, or meter them out per project

We will provide you with EPA = Effort, Participation, Altruism extra credit (confidential)

- 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 in lab, answering Piazza or Office Hrs questions}
- This can help boost you over a grade boundary if you're close to one

Peer instruction in lecture

- Not required for EPA; no clickers needed; google form online questions on phone/laptop

Handouts

- If you want them take them. If you don't, please don't (and we'll make fewer copies later)

You will be able to clobber your midterms with a better performance on your final

- If your % of points on your final is higher than either midterm, we map that % to your midterm and that's your new midterm! E.g., Final 50/100, Midterm 10/40. New midterm: 20/40

Announcements

- Discussion this week
- Lab next week
- You don't have to come to lecture, Friday and onward there will only be 1 lecture 2-3pm, so 500/1250 of you have to decide to watch the webcast only. We can't have anyone in the aisles per fire marshall rules.
- Take CS10 concurrently if you don't have any programming experience
- Don't take a handout if you won't use it, write on it, keep it.

Expressions

Types of expressions

An expression describes a computation and evaluates to a value

$$18 + 69$$

$$\frac{6}{23}$$

$$2^{100}$$

$$\sin \pi$$

$$\log_2 1024$$

$$7 \bmod 2$$

$$f(x)$$

$$|-1869|$$

$$\sum_{i=1}^{100} i$$

$$\sqrt{3493161}$$

$$\binom{69}{18}$$

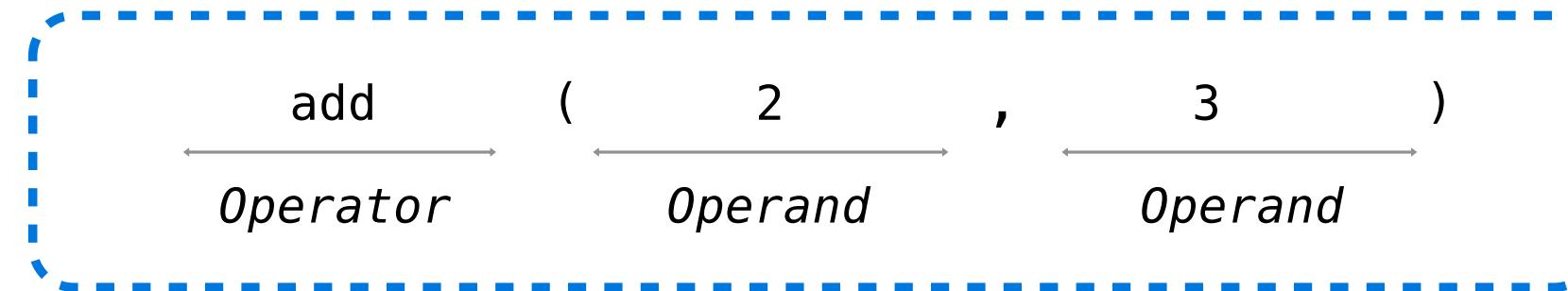
$$\lim_{x \rightarrow \infty} \frac{1}{x}$$

Call Expressions in Python

All expressions can use function call notation

(Demo)

Anatomy of a Call Expression



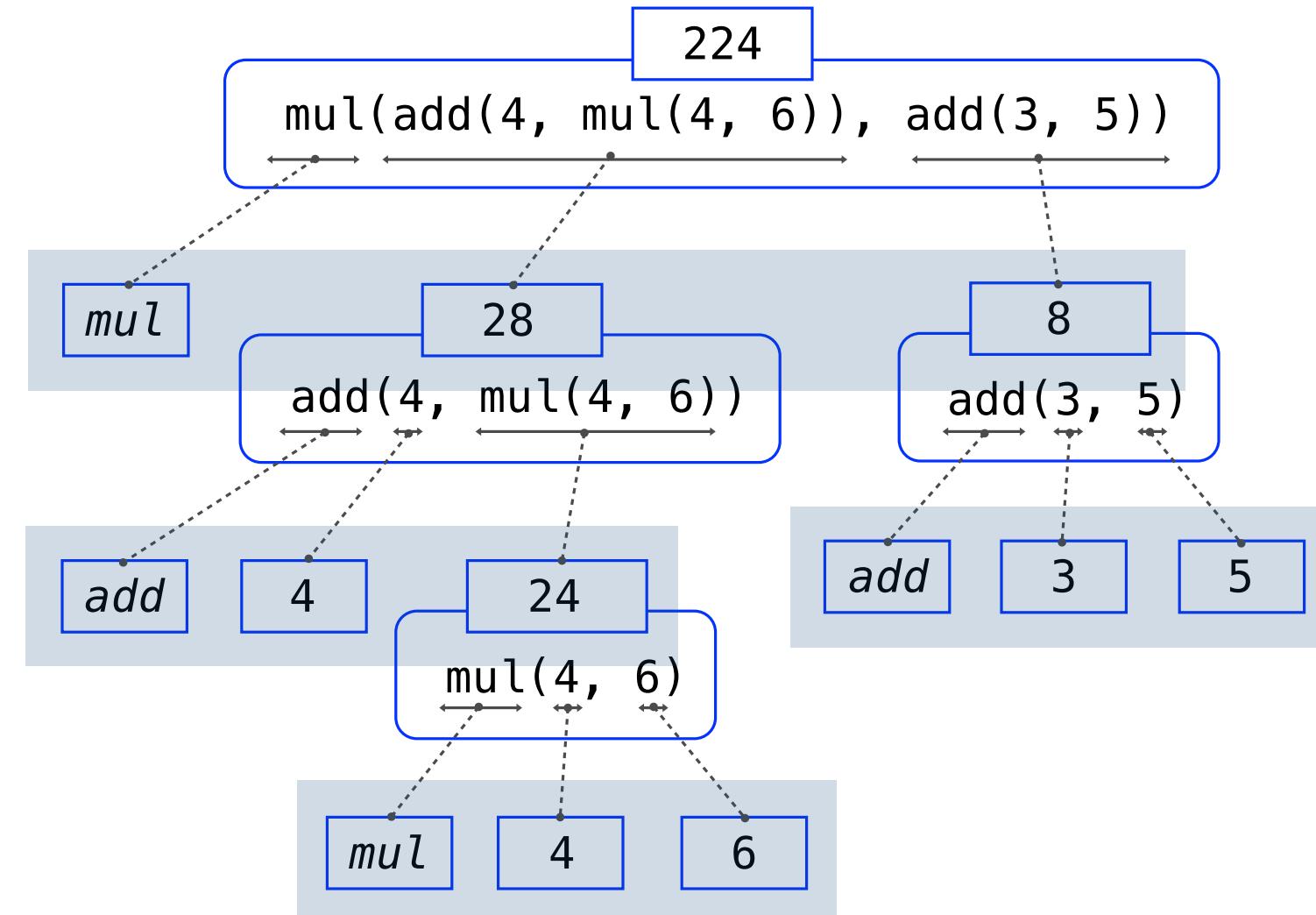
Operators and operands are also expressions

So they evaluate to values

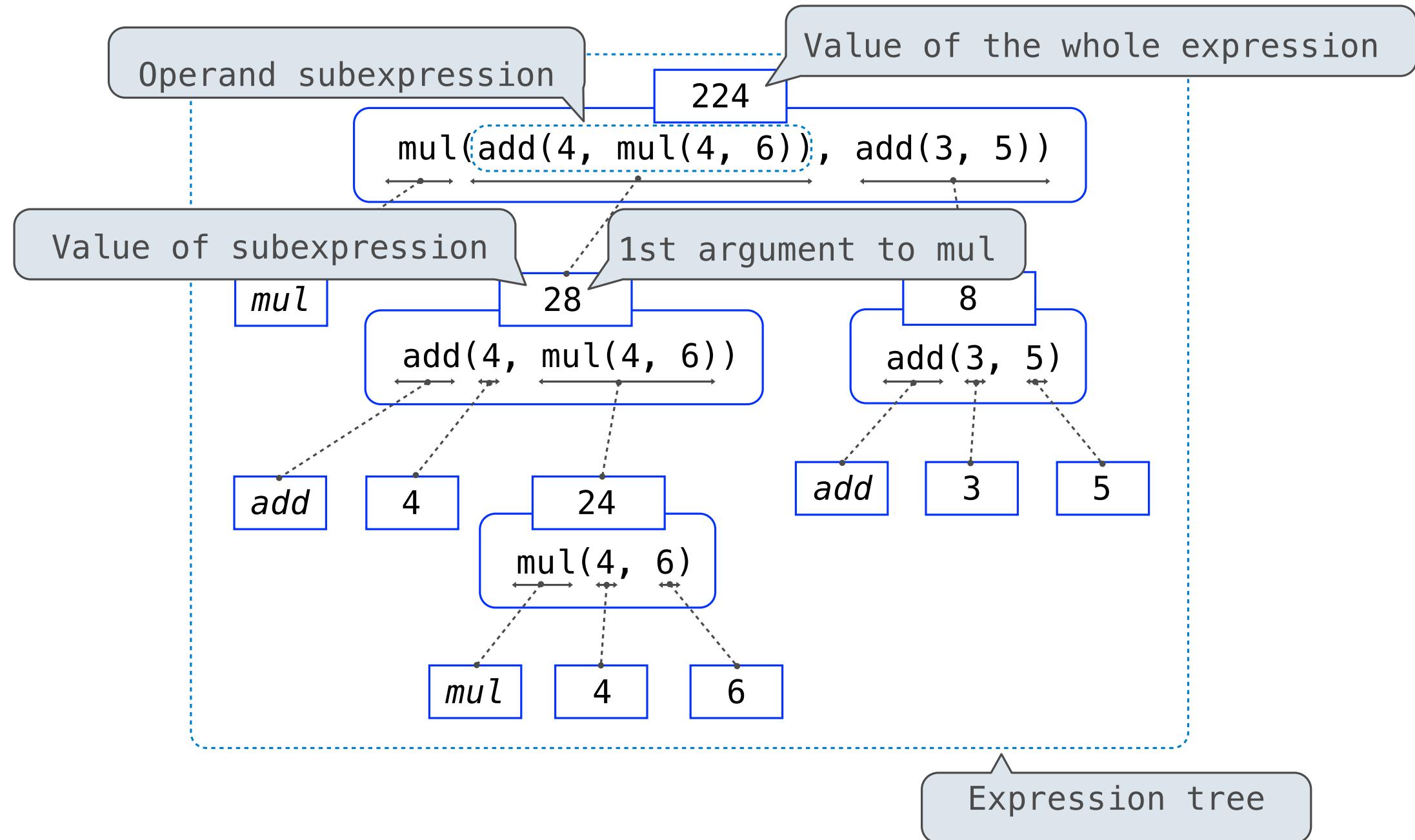
Evaluation procedure for call expressions:

1. Evaluate the operator and then the operand subexpressions
2. Apply the **function** that is the value of the operator
to the **arguments** that are the values of the operands

Evaluating Nested Expressions



Evaluating Nested Expressions



Functions, Values, Objects, Interpreters, and Data

(Demo)