LEC 02

# CSE 121

# Datatypes and Expressions

BEFORE WE START

***Talk to your neighbors:***

*What's your favorite song right now?*

**Respond on sli.do!**

Music: CSE 121 26sp Lecture Tunes


**Instructor:** Matt Wang

**TAs:**

| | | | | |
|---|---|---|---|---|
| Abdul | Amogh | Anant | Anum | Cayden |
| Dalton | Ethan | Hayden | Jesse | Jessica |
| Johnathan | Minh | Navya | Paul | Reese |
| Ruslana | Sam | Savannah | Spencer | Shayna |
| Tamsyn | TJ | Trey | | |


**Questions during Class?**

**Raise hand or send here**

**sli.do #cse121**

# Agenda (1/5)

- **Announcements, Reminders** ⟵
- Intro Survey Recap
- Datatypes and Expressions Review
- Expressions Practice
- Combining Variables and Expressions

# Announcements, Reminders

- Creative Project 0 due tonight by 11:59 PM
- Programming Assignment 0 releases later today
  - due Tuesday, April 14th at 11:59 PM
  - now on regular "cadence" (Wed release, due following Tue)
- IPL is open! Schedule & instructions on website.
- Section credit and Pre-Section Work details

# Agenda (2/5)

- Announcements, Reminders
- **Intro Survey Recap** ⟵
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# Intro Survey – things we're excited for! (1/2)

Learning how to code!

- "I am excited to enter the world of computer science and the language of coding"
- "Understanding the fundamental thinking behind programing and coding."
- "Learn how to code **with others**"
- "I'm just excited to learn what it's all 'about'. Coding seems like wizard language to me currently."

# Intro Survey – things we're excited for! (2/2)

- "Understanding how [CS] has an important role in our world!"
- "Coming from a humanities background, I'm most excited about expanding my knowledge into the technical field"
- "I am very excited about study groups/office hours possibilities. We're all relatively new to programming, so we will most likely also have similar struggles."
- "I'm excited to learn the basics of CS because my best friend majors in it at UCLA and I have no idea what he is talking about ever so maybe I can better understand him"

# Addressing worries from intro survey (1/3)

**Most common:** responses like… "Coding I have never touched it.. ever"

You're in the right place! This class expects zero prior knowledge.

Second most common: difficulty, workload, pace, & falling behind, e.g. "coding has a reputation for being super difficult"

- programming *can* be difficult (if it was easy: why have a class?)
- 121 has many support systems (section, IPL, office hours, Ed, etc.)
- if you feel like you're struggling: reach out early!
  - especially with pace of quarter system

# Addressing worries from intro survey (2/3)

Grades, competitiveness, this class being a "weed-out" class

- explicitly not the goal of this class
- course designed against this (grade guarantees, resubmissions, etc.)

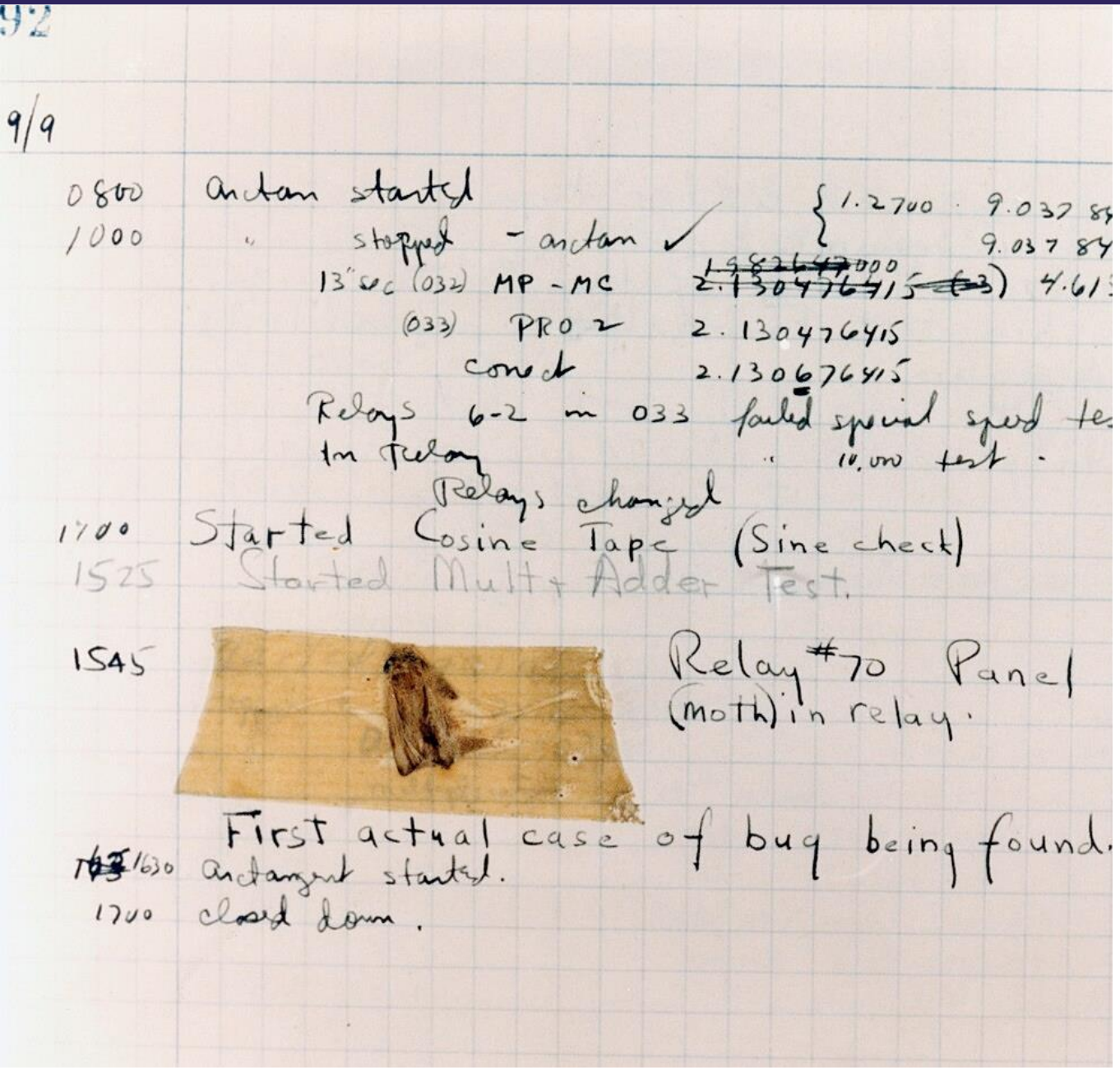
Quizzes & final exams (especially handwritten ones)

- timed assessments can be stressful – but we'll build you up slowly!
- will have many practice resources and opportunities!

# Addressing worries from intro survey (3/3)

Memorization & problem-solving

- programming isn't *really* about memorizing syntax (or specific facts)
  - programmers look things up all the time! (but, this takes time…)
  - on assessments, we will give you a reference sheet!
- (in our opinion) the hard part of programming is **problem-solving**
  - "breaking a big problem into smaller pieces"
  - "building a strong mental model of how a system works"
  - **we will explicitly work on this as a class!**




# Student Fun Fact: Bugs

"Computer 'bugs' got their name from an actual bug in a computer"

Coined by Grace Hopper – a foundational computer scientist (particularly in "programming languages").

Courtesy of the Naval Surface Warfare Center

# Other Fun Facts (from you)

- "Hummingbirds are the only birds that can face the front and fly backward."
- "Hippos have pink sweat that acts as both UV shielding and moisturizer."
- "Sweden has the most islands in the world”
- (and more!)

# Other Fun Facts (about you)

And … y'all are cool!

- "I know how to juggle and can go on for 20+ minutes"
- "I am in the drumline here at uw!"
- "i dance ballet folklorico"
- "I used to remember 75 digits of pi"
- "I know 120 digits of pi!"
- "I can make a hyperrealistic goat bleat."

Bottom line: meet each other and form a community! (and bleat?)

# Agenda (3/5)

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# PCM: Datatypes & Expressions

- Programming is about data; we tell Java what **type** of data we have!
- Datatypes (so far): `int`, `double`, `String`, `boolean`
  - note: only `String` is capitalized!
- All values in a (Java) program have a type!
  - some are more straightforward, e.g. `42` or `"hello world"`
    - aside: these are called **"literals"**
  - some are more complicated **expressions**!

# PCM: Operators

We learned a *ton* of operators!

**Numerical**:

- + Addition
- - Subtraction
- * Multiplication
- / Division (tricky!)
- % Modulo (or “mod”)
- <, >, <=, >=, ==, != Relational

**Strings:**

- + Concatenation (not addition!)

**Booleans:**

- ! Logical Not
- && Logical And
- || Logical Or
- == and != Relational

# PCM: Precedence

Operators have precedence (an order of operations).

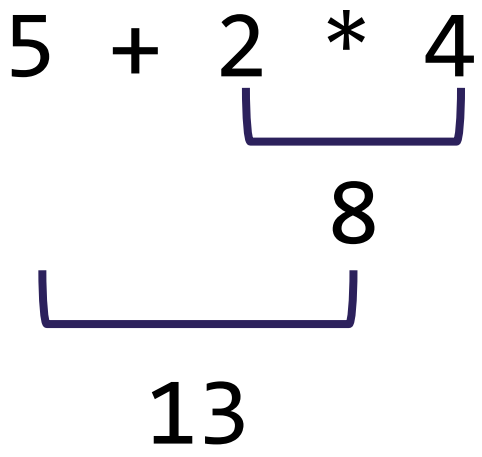
In Math:

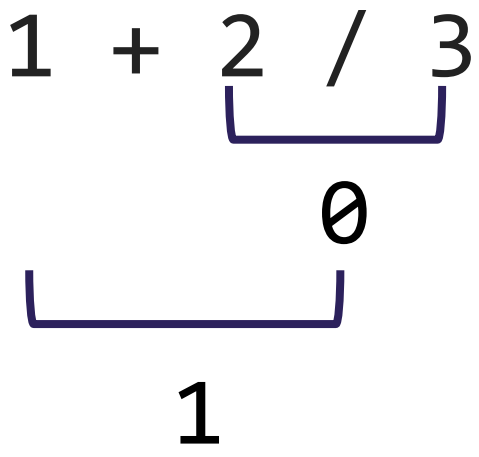
1. **P**arentheses
2. **E**xponent
3. **M**ultiplication
4. **D**ivision
5. **A**ddition
6. **S**ubtraction

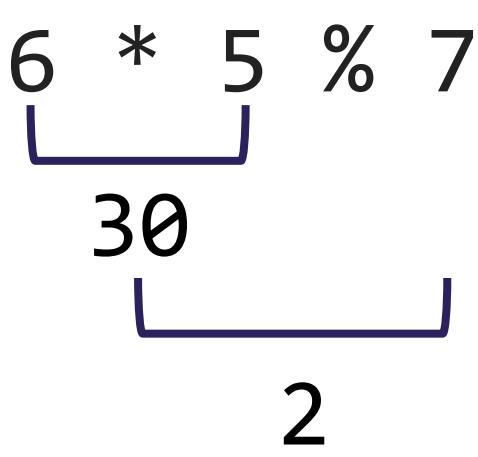
In Java:

1. Parentheses
2. Logical NOT
3. Multiplication, Modulo, Division
4. Addition (and concatenation), Subtraction
5. Relational operators
6. Equality operators
7. Logical AND
8. Logical OR

# Expressions in “little steps”



# PCM: Conversions

When mixing types in an expression, Java will convert one type to the other and then perform the operation "normally".

Some conversions are straightforward:

- `int`s can be converted to `double`s (add `.0`)
- `int`s and `double`s can be converted to `String`s (add `""`)

So, Java does these for you! (is this good? controversial!)

# New: Conversions (Gone Wrong!!)

Other conversions are “lossy”, because you lose data.

- e.g. to make `3.14` an `int`, you’d probably pick either 3 or 4 – but either one loses data
- Java won’t do this automatically for you – you need to “ask”.
  - called a **type cast**: you’ll see this in Friday’s PCM + in P0

Some conversions don’t make sense.

- how would you convert "Beyoncé" to an `int`? `double`?
- Java really doesn’t let you do these…

# Practice: Think

sli.do #cse121

*What does this expression evaluate to?*

```
2 + 2 + "hello" + 3 * 5 + 10
```

**A. "22hello3510"**
**B. "22hello1510"**
**C. "4hello1510"**
**D. "4hello25"**
**E. This will cause an error**

# Practice: Pair

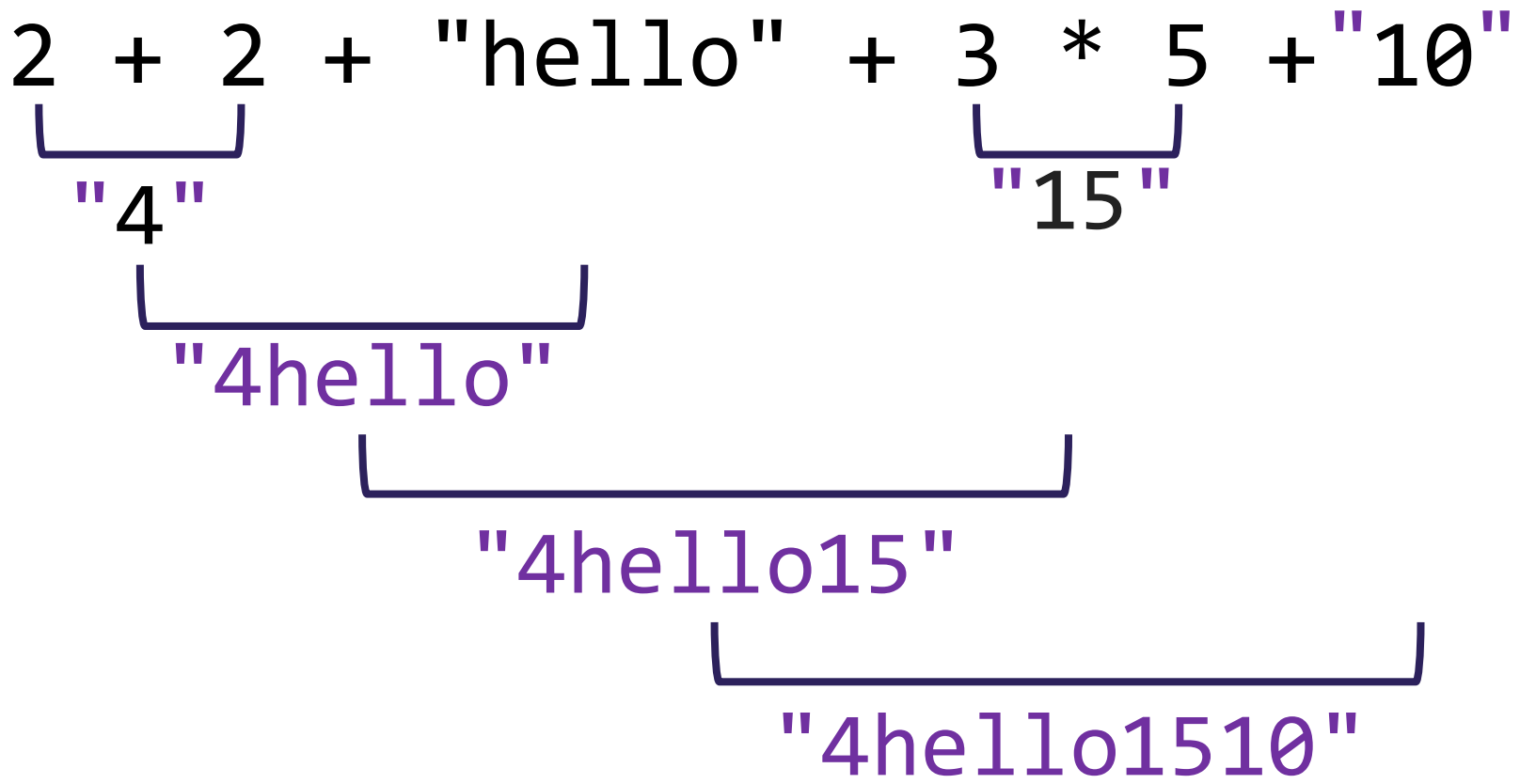
sli.do #cse121

*What does this expression evaluate to?*

```
2 + 2 + "hello" + 3 * 5 + 10
```

**A. "22hello3510"**
**B. "22hello1510"**
**C. "4hello1510"**
**D. "4hello25"**
**E. This will cause an error**

# Expression example with mixing types



# Agenda (4/5)

- Announcements, Reminders
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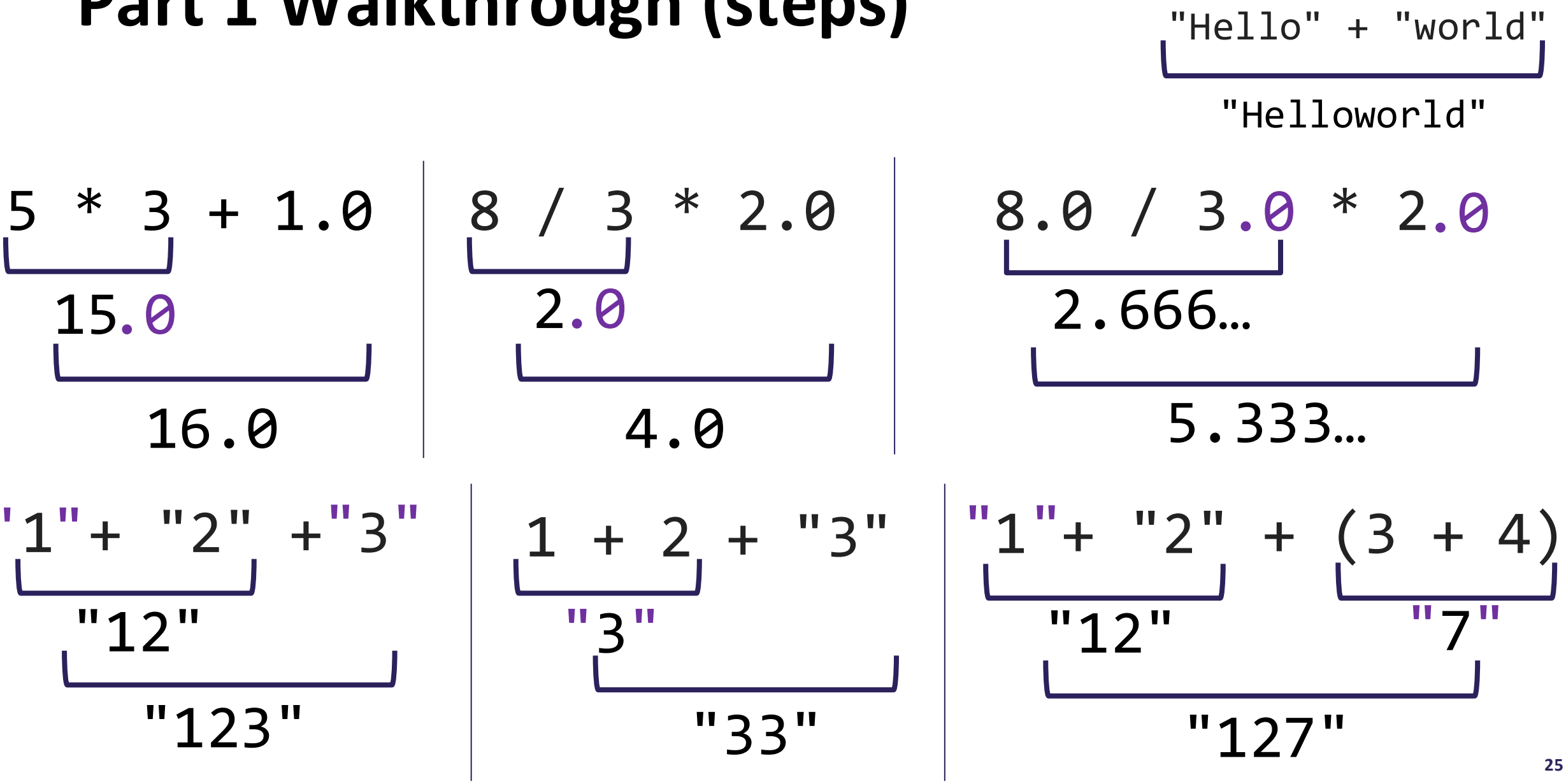
# Work on Expressions and Types Practice (1)

- On the Ed lesson for today, and on your handout
- Work with folks around you!
- TAs & I will walk around and help!

```
5 * 3 + 1.0
8 / 3 * 2.0
8.0 / 3 * 2
"Hello" + "world"
1 + "2" + 3
1 + 2 + "3"
1 + "2" + (3 + 4)
```

# Part 1 Walkthrough (steps)



# Work on Expressions and Types Practice (2)

- On the Ed lesson for today, and on your handout
- Work with folks around you!
- TAs & I will walk around and help!

```
5 * 3 < 12

10 % 3 == 10 / 3

5 < 9 || (7 != 7)

!(1 + 2 == 3 && 10 % 4 > 2)
```

# Part 2 Walkthrough (1)

```
5 * 3 < 12
  15
   15 < 12
    false
```

```
10 % 3 == 10 / 3
   1
      1 == 10 / 3
             3
      1 == 3
      false
```

```
5 < 9 || (7 != 7)
             false
5 < 9 || false
 true
 true || false
    true
```

# Part 2 Walkthrough (2)

```
!(1 + 2 == 3 && 10 % 4 > 2)
!(1 + 2 == 3 &&     2  > 2)
!(  3   == 3 &&     2  > 2)
!(  3   == 3 &&      false )
!(    true   &&      false )
!(           false         )
             true
```

# Agenda (5/5)

- Announcements, Reminders
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- Expressions Practice
- **Combining Variables and Expressions** ⟵

# Ed time :)

Applying what we learned to variables!

# P0: Cornbear's Café

- Programming Assignment 0 (**P0**)
  - Programming Assignments worth 4 ESN grades
  - Usually a *bit* longer than creative projects
- In P0, you'll
  - make a receipt generator
  - practice variables, data types, & expressions
  - learn a bit about **rounding**
  - reflect on the *rules* of Java and human language
  - see your first "specification" (or "spec") that breaks up a problem into individual pieces

```
-------------------------
     Cornbear's Café
 University of Washington
       "Seattle"
-------------------------
2 Espresso          $8.16
7 Sesame Latte      $43.75
4 Seattle Fog       $19.48
-------------------------
Subtotal            $71.39
-------------------------
Tax                 $7.38
Service fee         $1.21
Cornbear fee        $6.39
-------------------------
Total               $86.36
-------------------------
       thank you <3
     1:00 4/8/2026
```