

LEC 02

CSE 121

Expressions and Datatypes

Questions during Class?

Raise hand or send here

sli.do #cse121

BEFORE WE START

*Talk to your neighbors:**What's your favourite song right
now?*Music: 🌸 [CSE 121 25sp Lecture Tunes](#) 🌸**Instructor:** Miya Natsuhara

TAs:	Chloë	Hibbah	Sushma
	Ailsa	Julia	Kelsey
	Johnathan	Sahej	Shayna
	Christian	Ruslana	Hannah
	Merav	Hanna	Zach
	Judy	Maitreyi	
	Janvi	Ayesha	

Agenda

- **Announcements, Reminders** ←
- Intro Survey Recap
- Variables Example
- 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
 - making a receipt generator!
 - due Tuesday, April 15th at 11:59 PM
 - now on regular “cadence” (Wed release, due following Tue)
- IPL is open! [Schedule & instructions on website.](#)
- If you joined late, welcome!
 - Check out the [course website](#) and lecture recordings
 - Resubmissions are your friend!

Reminder: Post-Section Work

- Due at midnight on each quiz section day (except quizzes)
 - not strictly “did you go to quiz section”, though going helps
 - graded on attempt/effort only
 - helps your TAs plan quiz section!
- Optional (not part of your grade)
 - but, 12/16 give you an extra resub
 - up to you on whether or not you think it's helpful
- You will get PSW completion grades on Canvas
 - sorry! the only way for us to do this :(

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Intro Survey – things we're excited for!

- “Learning programming” / “Learning how to code”
- “Meeting new people who are enthusiastic about [programming]”
- “creative projects!”
- “learning java”
- “Having peers (a community) and resources for this course!”

Reassuring worries from intro survey (1/2)

Common: responses along the lines of... “not knowing how to code”

- You’re in the right place! This class expects zero prior knowledge.
- If you're worried about “technical jargon”, check out our [Glossary page](#)!

Difficulty, workload, pace, & falling behind

- Recognizing that programming can be difficult (if it was easy: why have a class?)
- As a result, have built 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

Reassuring worries from intro survey (2/2)

Grades, competitiveness, this class being a “weed-out” class

- Explicitly not the goal of this class
- Course is designed against this (minimum grade guarantees, resubmissions, etc.)

Quizzes & final exams (especially on paper)

- Timed assessments can be stressful – but we’ll build you up there slowly!
- Will have many practice resources (though, be wary of overfitting!)
- Practicing on paper can help a lot!

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PCM: Data Types & Expressions

- Programming is about data; we tell Java what **type** of data we have!
- Data types (so far): `int`, `double`, `String`, `boolean`
 - note: only `String` is capitalized!
- All values in a (Java) program have a type!
 - some are “obvious”, 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”

$$\begin{array}{ccccccc} 5 & + & 2 & * & 4 & & \\ & & \underbrace{} & & & & \\ & & & 8 & & & \\ \underbrace{} & & & & & & \\ & 13 & & & & & \end{array}$$

$$\begin{array}{ccccccc} 1 & + & 2 & / & 3 & & \\ & & \underbrace{} & & & & \\ & & & 0 & & & \\ \underbrace{} & & & & & & \\ & 1 & & & & & \end{array}$$

$$\begin{array}{ccccccc} 6 & * & 5 & \% & 7 & & \\ & & \underbrace{} & & & & \\ & & & 30 & & & \\ & & & \underbrace{} & & & \\ & & & & 2 & & \end{array}$$

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:

- `ints` can be converted to `doubles` (add `.0`)
- `ints` and `doubles` can be converted to `Strings` (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...

Expression example with mixing types

$$\underbrace{2 + 2}_{\text{"4"}} + \text{"hello"} + \underbrace{3 * 5}_{\text{"15"}} + \text{"10"}$$
$$\underbrace{\text{"4hello"}}_{\text{"4hello15"}} + \text{"10"}$$
$$\text{"4hello1510"}$$

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Work on Expressions and Types Practice (1)

- Ed lesson linked from course calendar
- 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

Work on Expressions and Types Practice (2)

- Ed lesson linked from course calendar
- 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

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- **Combining Variables and Expressions** ←

Ed time :)

Applying what we learned to variables!

What's in a (variable) name or String?

Switch over to Ed and do some experiments (with a partner), then report back on sli.do.

1. What types of characters are “allowed” in Strings?
2. What types of characters are “allowed” in variable names?



[sli.do #cse121](https://sli.do/#cse121)

Food for Thought!

This is the beginning of a very interesting rabbit hole!
(but also, a decision made by the Java designers)

Whether or not you program for a career,
you will also make decisions like these!

- for example, what's a “[valid name](#)”?
- a theme we'll revisit (and something to continuously reflect on!)

Announcements, Reminders (again)

- Creative Project 0 due tonight by 11:59 PM
- Programming Assignment 0 releases later today
 - making a receipt generator!
 - due Tuesday, Jan 21st at 11:59 PM
 - now on regular “cadence” (Wed release, due following Tue)
- IPL is open! [Schedule & instructions on website.](#)
- “Extra resources” tab – more practice! (with a caveat)