

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: [121 25wi lecture playlist](#) ❄️**Instructor:** Matt Wang

TAs:	Ailsa	Alice	Chloë	Christopher
	Ethan	Hanna	Hannah	Hibbah
	Janvi	Judy	Julia	Kelsey
	Lucas	Luke	Maitreyi	Merav
	Ruslana	Samrutha	Sam	Shayna
	Sushma	Vivian		

Announcements, Reminders

- 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)

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 :(

Intro Survey – things we're excited for!

- “Learning programming” / “Learning how to code”
- “Being introduced to the world of computer science”
- “I love working on things where I can be creative with what I do.”
- “Getting to meet people and problem solve with others.”
- “understanding a mysterious world of tech”
- “Learning how to program in JAVA!”
- “Matt”

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.

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 designed against this (minimum grade guarantees, resubmissions, etc.)

Quizzes & final exams

- timed assessments can be stressful – but we’ll build you up there slowly!
- will have many practice resources (though, be wary of overfitting!)

Not doing the optional work

- really mature thought!
- something to work on over time (and build discipline)

PCM Recap: 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 Recap: 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 Recap: 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”

$$5 + 2 * 4$$

8

13

$$1 + 2 / 3$$

0

1

$$6 * 5 \% 7$$

30

2

PCM Recap: 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 **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...

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

"Hello" + "world"
"Helloworld"

5 * 3 + 1.0
15.0
16.0

8 / 3 * 2.0
2.0
4.0

8.0 / 3 * 2.0
2.666...
5.333...

"1" + "2" + "3"
"12"
"123"

1 + 2 + "3"
"3"
"33"

"1" + "2" + (3 + 4)
"12" "7"
"127"

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 (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)

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](#)

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!)

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