CSE 121 – Lesson 2

Miya Natsuhara
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Music: 121 23au Lecture Tunes 🌦️

TAs: Trey Christina Sahej Vinay Kriti
    Sebastian Colton Anju Maria Minh
    Annie Janvi Jonus Shreya Vivian
    Jasmine Arkita Lydia Andy Nicole
    Christian Vidhi Luke Nicolas Simon
    Lucas Ritesh Andras Shayna Jessie
    Logan Hibbah Archit Hannah Lydia
    Jacob Julia Ayesha Aishah Yijia
Announcements, Reminders

• **Creative Project 0** due tonight (Oct 4) @ 11:59 PM
• Programming Assignment 0 released later today (due Tues, Oct 10)
• IPL is open! - [Schedule and instructions](#) can be found on course website.
• **Just joined CSE 121?** Resubmission policy is your friend! See more in [syllabus](#).

• Reminder: Pre-Class Work and Section work are not graded! (but you should do them anyway 😄)
PCM Recap: Data Types & Expressions

- Types: int, double, String, boolean
- Expressions: Operators
- Beware of precedence! (order of operations)
Data Types in Java

In programming, you’re dealing with data...

• ints (whole numbers)
• doubles (real numbers)
• Strings
• booleans (true or false)
Operators (for numerical & String values)

Numerical:
• + Addition
• - Subtraction
• * Multiplication
• / Division
• % Modulo or “Mod”

• <, >, <=, >=, ==, !=

Strings
• + Concatenation

Booleans
• ! Logical Not
• && Logical And
• || Logical Or
(PCM) Precedence

Parentheses

Multiplication, Modulo, Division

Addition (and Concatenation), Subtraction

If multiple operators at the same level?

Evaluate subexpressions from left to right!
Example

1 + 2 * 3

\[ 1 + 6 \]

\[ 7 \]

\[(1 + 2) * 3\]

\[ 3 * 3 \]

\[ 9 \]
Work on Expressions/Types Practice Problems

Part 1

• Ed lesson linked from the course calendar

• Work with the folks around you!

• TAs and I will be walking around to help

\[ \text{5 } + \text{2} \times \text{4} \]
\[ \text{1 } + \text{2} \div \text{3} \]
\[ \text{6} \times \text{5} \% \text{7} \]
Questions?

\[
\begin{align*}
\frac{5 + 2 \times 4}{5 + 8} &= \frac{13}{13} = 1 \\
\frac{1 + 2/3}{1 + 0} &= \frac{1}{1} = 1 \\
\frac{6 \times 5 \% 7}{30 \% 7} &= \frac{2}{2} = 1
\end{align*}
\]
(PCM) Mixing Types

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

- ints can be converted to doubles

- Both ints and doubles can be converted to Strings
Example 2

\[ 2 + 2 + "\text{hello}" + 3 \times 5 + 10 \]

\[ 2 + 2 + "\text{hello}" + 15 + 10 \]

\[ "4" + "\text{hello}" + 15 + 10 \]

\[ "4\text{hello}15" + 10 \]

\[ ⇒ "4\text{hello}1510" \]
Work on Expressions/Types Practice Problems

Part 2

• Ed lesson linked from the course calendar
  
• Work with the folks around you!

• TAs and I will be walking around to help

- $5 \times 3 + 1.0$
- $8 / 3 \times 2.0$
- $8.0 / 3 \times 2$
- "Hello" + "world"
- $1 + "2" + 3$
- $1 + 2 + "3"
- $1 + "2" + (3 + 4)$
Questions?

\[
\begin{align*}
5 \times 3 + 1.0 &= 16.0 \\
8/3 \times 2.0 &= 4.6 \\
8.0/3 \times 2 &= 5.333 \\
\text{"Hello" + "World"} &= \text{"Hello World"}
\end{align*}
\]

\[
\begin{align*}
\text{"1" + "2" + 3} &= \text{"123"} \\
\text{"12" + 3} &= \text{"123"} \\
\text{"33"} &= \text{"33"} \\
\text{"3" + "3"} &= \text{"33"} \\
\text{"12" + 7} &= \text{"127"} \\
\text{"12" + 7} &= \text{"127"}
\end{align*}
\]
Boolean Operators

- ! Logical Not
- <> <= >= Relational Operators
- == != Relational Operators (equality)
- && Logical And
- || Logical Or
(PCM) Precedence (updated)

Logical not
Parentheses
Multiplication, Modulo, Division
Addition (and Concatenation), Subtraction
Relational operators
Equality operators
Logical and
Logical or
Example 3

\[1 + 2 \times 3 \neq (1 + 2) \times 3\]

\[1 + 2 \times 3 \neq 3 \times 3\]

\[1 + 6 \neq 3 \times 3\]

\[7 = 9 \Rightarrow \text{true}\]
Work on Expressions/Types Practice Problems

Part 3

• Ed lesson linked from the course calendar

• Work with the folks around you!

• TAs and I will be walking around to help

\[
5 \times 3 < 12
\]

\[
10 \% 3 == 10 / 3
\]

\[
5 < 9 || (7 != 7)
\]

\[
!(1 + 2 == 3 && 10 \% 4 > 2)
\]
Questions?

\[
\begin{align*}
5 \times 3 &< 12 \\
15 &< 12 \\
\text{false} &
\end{align*}
\]

\[
\begin{align*}
10 \div 3 &= \frac{10}{3} \\
1 &= \frac{10}{3} \\
1 &= 3 \\
\text{false} &
\end{align*}
\]

\[
\begin{align*}
5 < 9 &\quad \text{||} \quad (7 \neq 7) \\
5 < 9 &\quad \text{||} \quad \text{false} \\
\text{true} &\quad \text{||} \quad \text{false} \\
\text{true} &
\end{align*}
\]
Questions?

\[ (1+2=3 \land 10 \div 4 > 2) \]
\[ (1+2=3 \land 2 > 2) \]
\[ (3=3 \land 2 > 2) \]
\[ (\text{true} \land 2 > 2) \]
\[ (\text{true} \land \text{false}) \]
\[ (\text{false}) \Rightarrow \text{true} \]
Variables

- Now that we know about different types and data, we can learn about how to store it!
- Java allows you to create variables within a program. A variable has
  - A type
  - A name
  - (Potentially) a value it is storing

Declaration: \texttt{int x;}
Initialization: \texttt{x = 30;}

Or all in one line: \texttt{int x = 30;}