Welcome to CSE 121!

Use this QR code as one way to ask questions!

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sli.do #cse121
Announcements, Reminders

• **Creative Project 0** due tonight (June 26) @ 11:59 PM

• Programming Assignment 0 released later today (due Tues, July 2)

• IPL is open! - *Schedule and instructions* can be found on course website.

• Reminder: please double-check all quiz and exam dates (let Simon know ASAP if you can’t make it!)
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)
(PCM) 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

\[
1 + 2 \times 3 \\
\underline{= 1 + 6} \\
\underline{= 7}
\]

\[
(1 + 2) \times 3 \\
\underline{= 3 \times 3} \\
\underline{= 9}
\]
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

\[
\begin{align*}
5 + 2 \times 4 \\
1 + 2 / 3 \\
6 \times 5 \% 7
\end{align*}
\]
Questions?

\[ 1 + \frac{2}{3} \div \frac{2}{3} = 1 + 0 = 1 \]

\[ 6 \times 5 \mod 7 = 30 \div 7 = 2 \text{ remainder } 4 \]

\[ 4R2 \]
(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

\[ 2 + 2 + "hello" + 3 * 5 + 10 \]

= \[ 2 + 2 + "hello" + 15 + 10 \]

= \[ 4 + "hello" + 15 + 10 \]

= \"4\"hello\" + 15 + 10 \]

= \"4hello15\" + 10 \]

= \"4hello1510\"
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
• Can always refer back to PCM!

\[
\begin{align*}
5 \times 3 + 1.0 & \\
8 / 3 \times 2.0 & \\
8.0 / 3 \times 2 & \\
"Hello" + "world" & \\
1 + "2" + 3 & \\
1 + 2 + "3" & \\
1 + "2" + (3 + 4) & 
\end{align*}
\]
Questions?

\[ \frac{8.013 \times 2}{2.6 \times 2} = 5.3 \]
(PCM) Boolean Operators

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

Parentheses

Logical not

Multiplication, Modulo, Division

Addition (and Concatenation), Subtraction

Relational operators

Equality operators

Logical and

Logical or
Example 3

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

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

7 \neq 9

[True]

\[ (7 = 9 \Rightarrow False) \]
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
- Can always refer back to PCM!

5 * 3 < 12
10 % 3 == 10 / 3
5 < 9 || (7 != 7)
!(1 + 2 == 3 && 10 % 4 > 2)
Questions?

$10^3 / 3 = = 10 / 3$

1 = = 3

False

!(l+2==3 && l>(l>4>2))

!(3==3 && 2>2)

!(1 != 2 == )

!(1 == )

?
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:  `int x;`
Initialization:  `x = 30;`

Or all in one line:  `int x = 30;`
**Variables**

They’re made to be manipulated, modified,

```java
int myFavoriteNumber = 7;
int doubleFV = myFavoriteNumber * 2;
myFavoriteNumber = myFavoriteNumber + 3;
```

Notice – this doesn’t really make any mathematical sense! That’s because, in Java, = is assignment, not equality!