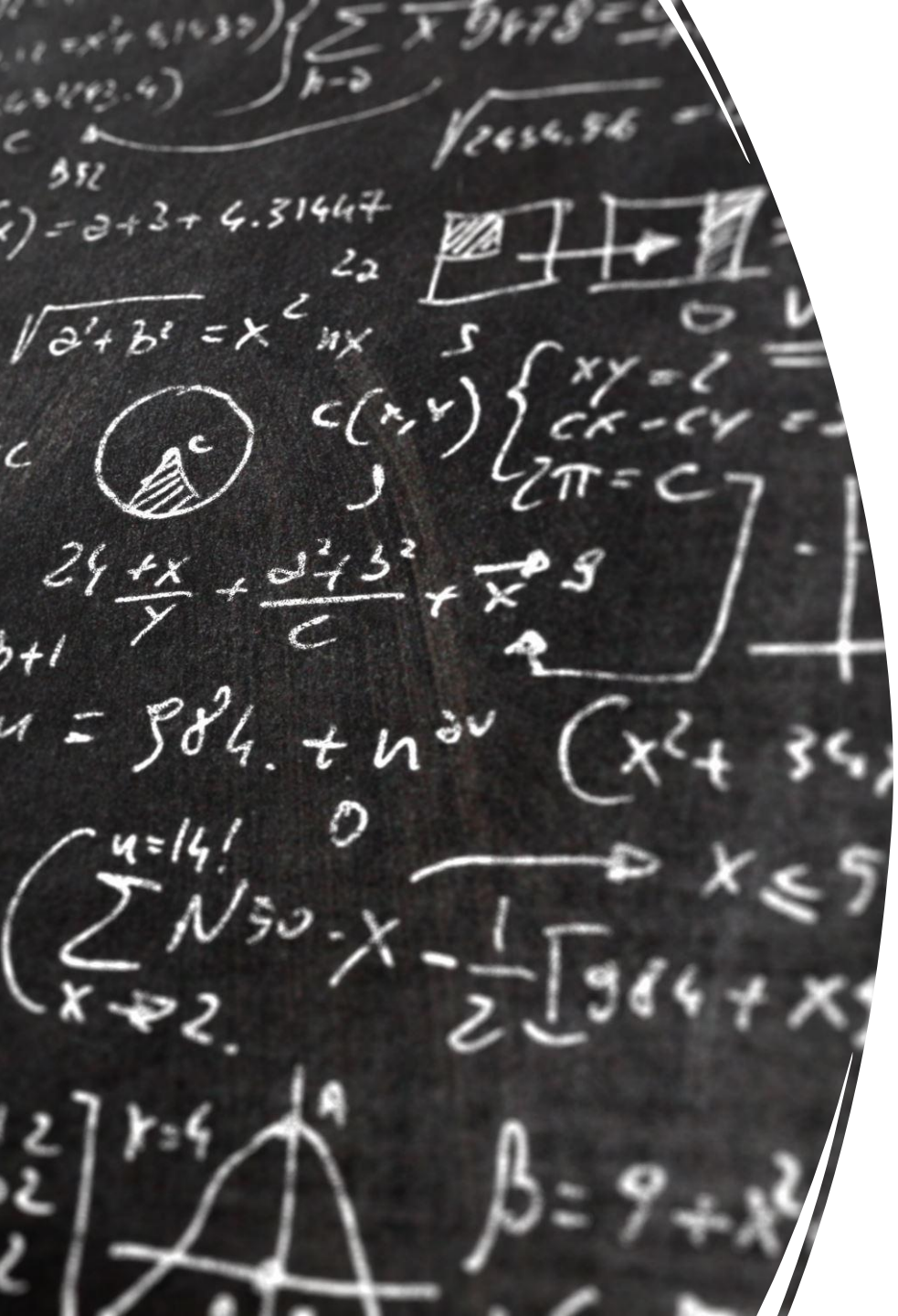


CS 113 – Computer Science I

Lecture 02 – Data Types, Variables, Expressions

Announcements

- Lab1 today
- Homework will be released Sunday due Thursday (Feb 1st)

Outline

Review

Reading in data

Data Types

Variables

Expressions

Operators

Navigating Linux Directory

Terminal commands

- List files
  - ls
- Move directories
  - cd
- Print the path to working directory
  - pwd
- Compile a java program
  - javac <java file>
- Run a java program
  - java <class name>

Java Review

code :)

Types of Errors

- Syntax error
  - didn’t follow the rules of the programming languages “grammar”
  - caught by the compiler

- Runtime error:
  - program compiles, but crashes when executing

- Logic error:
  - program compiles and runs but doesn’t do what we intended

Reading in data

- Way to communicate to our program by passing data to our program
- System.console().readLine();

code :)

Ask how <input> is doing

How do we do this????

We need to **store** that information to later print it out

Back to coding!

Storing Data

Data Types

- Way to store information in programs
- int: whole numbers
- double: numbers with decimal points
- String: anything between quotations

Why do we need types??

- Memory
- Readability and Documentation
- Enforcement of proper operations

Variables - Holders for values

- String greeting;
  - Creates a variable called “greeting” that can store a string
  - No value
  - “Declaration Statement”

- int a, b, c;
  - Creates 3 variables that can store integers
  - Is this a declaration statement?

Declaration & Assignment statement
Best Practice!

- a = 3;
  - assignment statement!
  - puts values in the memory location

- int d = 10;
  - Declaration or assignment?

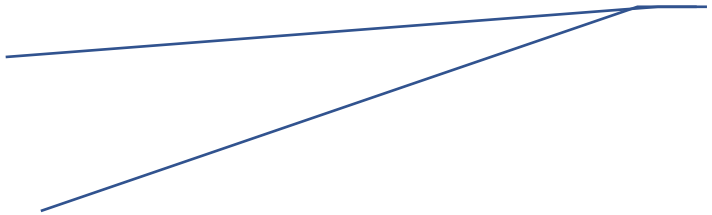
Variables - Holders for values

- String greeting;
  - Creates a variable called “greeting” that can store a string

- int a, b, c;
  - Creates 3 variables that can store integers

- a = 3;

- int d = 10;



These values are called “literals”

Properties of Variables

Variables have the following properties:

- Type
- Name
- Value

Example:

```
String greeting = “hello!”;
```

Let’s code this

Variable Examples

a	b	c
-	-	-

Variable Examples

- int a, b;

a	b	c
-	-	-

Variable Examples

- int a, b;

a	b	c
undefined	undefined	-

Variable Examples

- int a, b;

- String c = “Coco”;

a	b	c
undefined	undefined	-

Variable Examples

- int a, b;
- String c = “Coco”;

a	b	c
undefined	undefined	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;

a	b	c
undefined	undefined	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;

a	b	c
3	undefined	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;
- b = a;

a	b	c
3	undefined	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;
- b = a;

a	b	c
3	3	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;
- b = a;
- a = 5;

a	b	c
3	3	“Coco”

Variable Examples

- int a, b;
- String c = “Coco”;
- a = 3;
- b = a;
- a = 5;

a	b	c
5	3	“Coco”

Rules for naming variables

code :)

- Case sensitive
- Can’t:
  - start with a number
  - Contain special characters: *, +, -, /, %, $, #, etc.
  - No spaces
  - Special words:
    - String, int, main, for, while, …

Performing operations on data

Operators & Expressions

code :)

Order of operations

- 24 + 10 / 2;
- (24 + 10) / 2;

- Operations between doubles and ints:
  - 1 / 3
  - 1 / 3.0

String Operators (Textbook: 2.8)

What is the term for combining strings together?

- Concatenation

What is the concatenation operator?

- +

Converting Types

Exercise: Miles to Kilometers

Write a program called MilesToKMs.java that asks a user for miles and then prints out the distance in kilometers

- java MilesToKMs

  50 miles is 80 kilometers

Converting Types (Strings & Numbers)

- Integer to String
  - int a = 23;
  - String numMajors = String.valueOf(a);

- String to integer
  - int x = Integer. parseInt(“40”);

- String to double
  - double a = Double.parseDouble(“40.11”);

Wrap up:

1. How do you print in Java?
2. How do you read input?
3. What does a declaration statement do?
4. What does an assignment statement do?
5. Give me an example of an illegal variable name.
6. Give me an example of an operator.

Math utilities

- Math.round(40.11);
- Math.cos(0);
- Math.sqrt(9);
- Math.random();

Converting Types

- Double to integer:
  - (int) 3.14;
  - int a = (int) 3.14; // Store the converted double in a var

- Storing an integer as a double:
  - double b = 6;