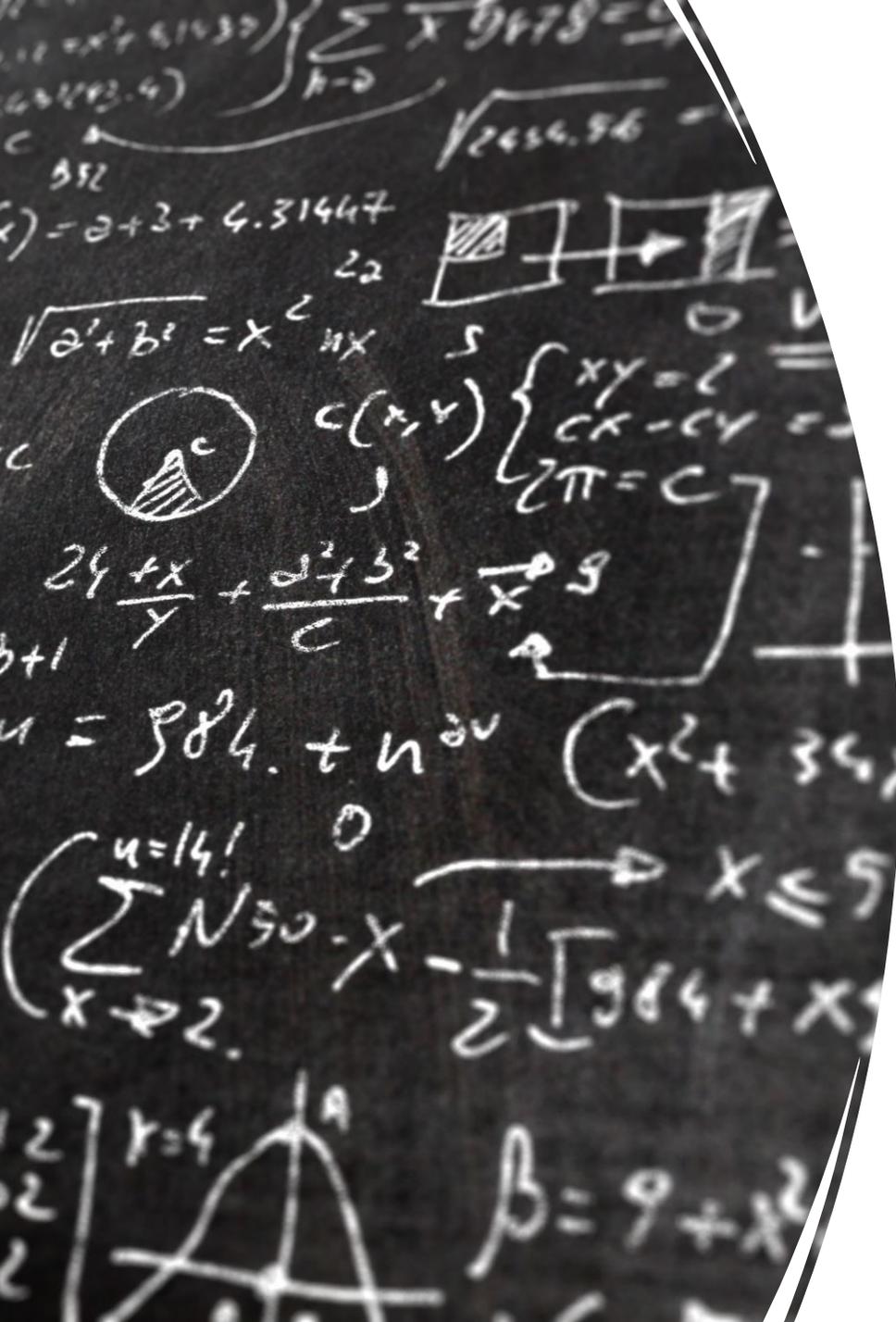


Loop Exercise: Sum first n number

Write a program, SumN.java that asks the user for an integer N and then computes the sum from 1 to N using a loop



CS 113 – Computer Science I

Lecture 06 – Loops

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09/20/2022

Announcements

- Assignment 02
 - Due Thursday 09/22
- No Lecture next Tuesday (09/27):
 - watch the recording from Section 1's Monday (09/26)
- Office hours:
 - Adam's: 10:30-11:30am on Wednesdays



Agenda

- Announcements
- Review:
 - Assignment 01
- Arrays
- Strings revisited
- Redirecting data

Assignment 01 – modulo (%)

- No need for condition
- $a \% b$ if $a < b$:
 - $a \% b = a$
- $25 \% 24 =$
 - 1
- $1 \% 24 =$
 - 1

Assignment 01 - printf

- <https://docs.oracle.com/javase/tutorial/java/data/numberformat.html>

```
printf(String format, Object... args)
```

Exercise: LoopPattern.java

```
$ java LoopPattern  
Enter a length: 5  
*_**_*
```

```
$ java LoopPattern  
Enter a length: 10  
*_**_*_*_*_*
```

```
$ java LoopPattern  
Enter a length: 0
```

```
$ java LoopPattern  
Enter a length: 1  
*
```

Exercise: Nested loops

```
$ java Square
```

```
Enter a size: 5
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```
$ java Square
```

```
Enter a size: 1
```

```
*
```

```
$ java Square
```

```
Enter a size: 0
```

Arrays

Arrays

Idea: Store multiple values into a single variable

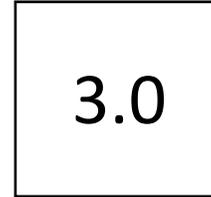
Values are sequential

Analogous to a list

Arrays

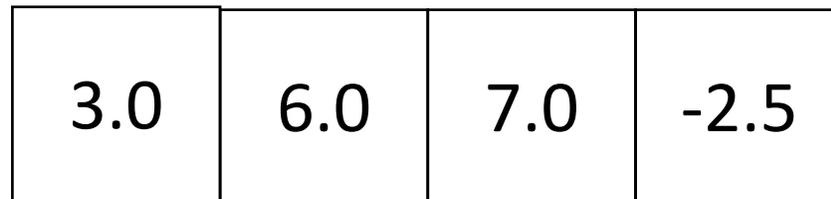
```
double val = 3.0;
```

val



```
double[] vals = {3.0, 6.0, 7.0, -2.5};
```

vals



Arrays

```
boolean[] flags = {true, false};
```

```
String[] greetings = {"hi", "hola", "ciao", "aloha"};
```

Arrays

Three ways to initialize an array

1. With an initial value
2. With allocated space, but uninitialized
3. With an empty array reference

Arrays

Three ways to initialize an array

1. With an initial value

```
int[] numbers = {1, 2, 5};
```

2. With allocated space, but uninitialized

```
int[] numbers = new int[3];
```

3. With an empty array reference

```
int[] numbers = null;
```

Array Indexing

Access individual elements of an array with indexing



We use *zero*-based indexing

first element is **0**

last element is **length-1**

Accessing indices out of range results in a **runtime error!**

Arrays

```
int[] sequence = new int[10];  
for (int i = 0; i < sequence.length; i++)  
{  
    sequence[i] = i+1;  
}
```

Exercise: print backwards

Write a program, `Backwards.java`, that asks the user for 5 integers and then prints the list of numbers in reverse order

Strings

Strings are implemented as *arrays of characters*

Get the length of a string with `length()`

```
String greeting = "hola";
```

```
int len = greeting.length(); // what is the length?
```

```
char c = greeting[2]; // what character is in index 2?
```

char: New built-in type, denoted with single quote, e.g. 'a' or '{'

Exercise: GetCharacters.java

Write a program, GetCharacters.java, that asks the user for a word and then prints the first, last and middle character.

```
Enter a word: hola!  
FirstIndex: 0 FirstCharacter: h  
MiddleIndex: 2 MiddleCharacter: l  
LastIndex: 5 LastCharacter: !
```

Command line arguments (revisited)

```
public static void main(String[] args)
```

Command line arguments are an *array of String*

Exercise: Write a program called `commandLineArgs.java` that prints out all the command line arguments that are passed in.

Redirection - Output

We can save the console output of a program to a file

```
java compiled_java_class > file
```

We can load console input into a program from a file

```
java compiled_java_class < file
```

Redirection - Input

We can load console input into a program from a file

```
java compiled_java_class < file
```

StdDraw: Basics

public class StdDraw (*basic control commands*)

void setCanvasSize(int w, int h)	<i>create canvas in screen window of width w and height h (in pixels)</i>
void setXscale(double x0, double x1)	<i>reset x-scale to (x0, x1)</i>
void setYscale(double y0, double y1)	<i>reset y-scale to (y0, y1)</i>
void setPenRadius(double radius)	<i>set pen radius to radius</i>

public class StdDraw (*basic drawing commands*)

void line(double x0, double y0, double x1, double y1)
void point(double x, double y)

StdDraw: Shapes

```
public class StdDraw (shapes)
```

```
void circle(double x, double y, double radius)
```

```
void filledCircle(double x, double y, double radius)
```

```
void square(double x, double y, double r)
```

```
void filledSquare(double x, double y, double r)
```

```
void rectangle(double x, double y, double r1, double r2)
```

```
void filledRectangle(double x, double y, double r1, double r2)
```

```
void polygon(double[] x, double[] y)
```

```
void filledPolygon(double[] x, double[] y)
```

StdDraw: Draw a face!

StdDraw: text

```
public class StdDraw (text and color commands)
```

```
void text(double x, double y, String s)
```

```
void setFont(Font font)
```

```
void setPenColor(Color color)
```

StdDraw: Animation

public class StdDraw (*advanced control commands*)

void enableDoubleBuffering()	<i>enable double buffering</i>
void disableDoubleBuffering()	<i>disable double buffering</i>
void show()	<i>copy the offscreen canvas to the onscreen canvas</i>
void clear()	<i>clear the canvas to white (default)</i>
void clear(Color color)	<i>clear the canvas to color color</i>
void pause(double dt)	<i>pause dt milliseconds</i>

StdDraw: Draw a moving ball