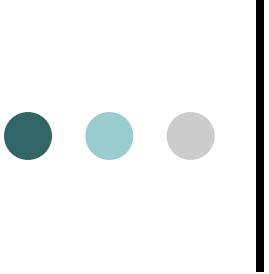


Chapter 4 - Fundamental Data Types

Dr Kafi Rahman, PhD
Email: kafi@truman.edu
Truman State University

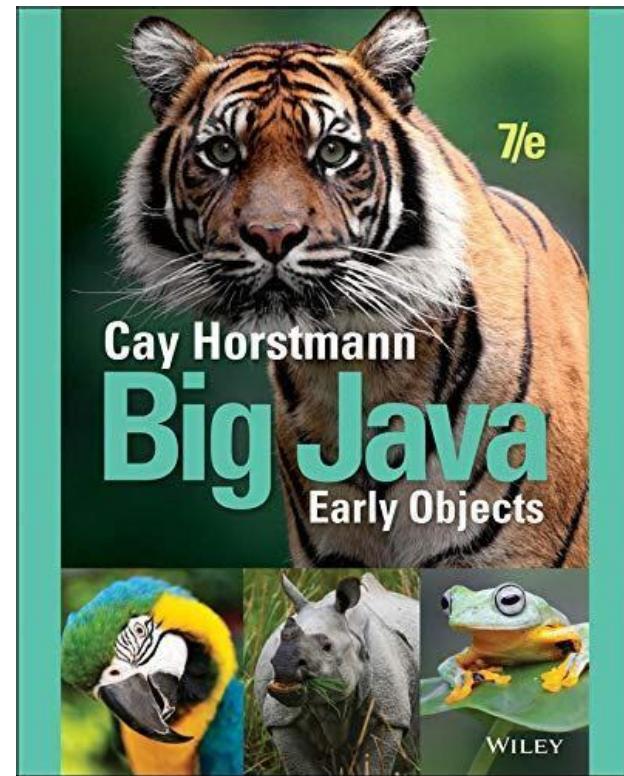


Your Instructor

- Instructor: Dr. Kafi Rahman
- Office: VH2242
- Email: kafi@truman.edu
 - Usual response time would be within 24 hours (weekdays)
 - During weekends, the response time will be by 48 hours or more
- Office hours:
 - Monday and Friday, 8:30am to 1:20pm
 - Use section name in your email subject

Useful Information

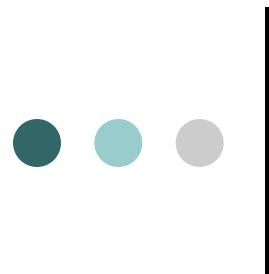
- Class website:
 - Blackboard
- Syllabus
 - Blackboard
- Course book:
 - Big Java: Early Objects, 7th Edition
 - Cay S. Horstmann edition
 - ISBN
978-1-119-74020-9





Software and Platforms

- Java SE16 compiler
 - use this download link
- Preferred IDE
 - Eclipse IDE: use the latest version
- The students can use other IDEs including Visual Studio Code



The Marking Scheme

- Lab/Programming Homework – the students will be provided at least a week to complete and submit their homework.
- Midterm Exam – There will be a midterm exam. The tentative date for the exam would be Thursday, September 30, 2021
- Final Exam – There will be a Final exam worth 30% of the total score of the course.
 - All in-class exams and the final exam will be comprehensive/descriptive.
 - The exams can be open-notes and open books depending on the students preference

Category	Points
Lab and Programming Homeworks	90
Mid-term Exam	90
Final Exam	90
Quiz + Attendance	30
Total	300



What You Will Do In This Course

- Mostly, you will think deeply about programs/algorithms by using object oriented techniques of Java.
 - Incorporate library data types (collections) and data structures and leverage them in your program to solve problems
 - Learn programming design patterns

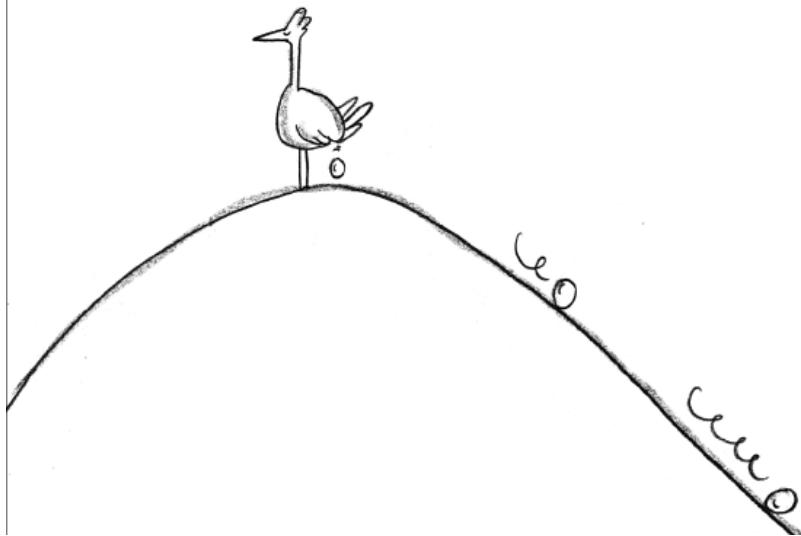
What You Will Do In This Course

- And have lots of fun learning one of the most amazing language and IDE in the world !!!



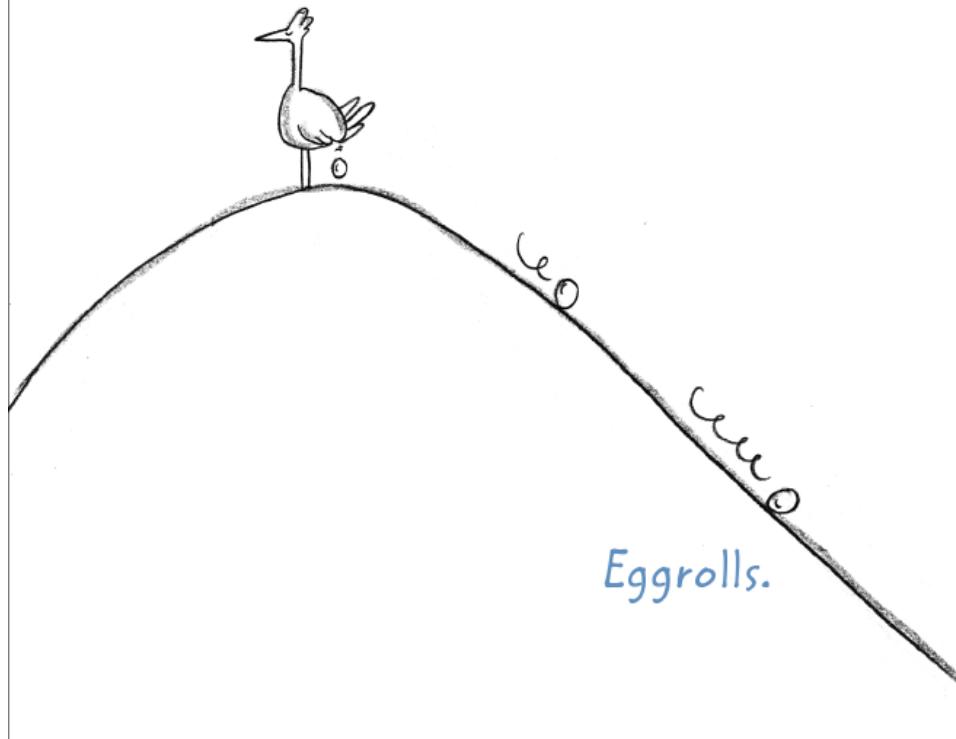
Punny Quiz 1 of 7

What do you get when a chicken lays its eggs on the top of a hill?



Punny Quiz 1 of 7

What do you get when a chicken lays its eggs on the top of a hill?





Punny Quiz 2 of 7

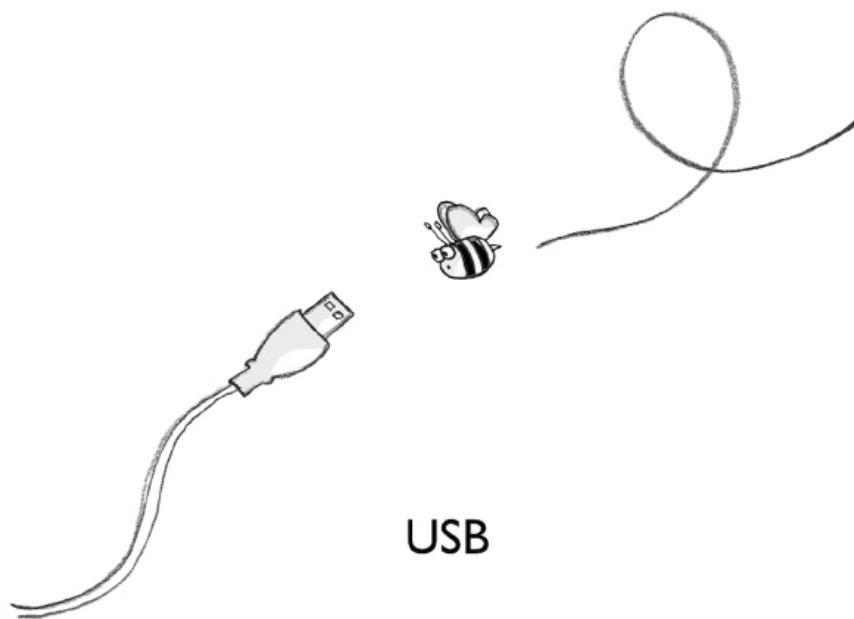
What do you call a bee that comes from America?



● ● ● |

Punny Quiz 2 of 7

What do you call a bee that comes from America?



● ● ● |

Punny Quiz 3 of 7

What do you call a bear with no ears?



● ● ● |

Punny Quiz 3 of 7

What do you call a bear with no ears?



B.

● ● ● |

Punny Quiz 4 of 7

What do you call a magic dog?



● ● ● | Punny Quiz 4 of 7

What do you call a magic dog?



A Labracadabrador.

● ● ● |

Punny Quiz 5 of 7

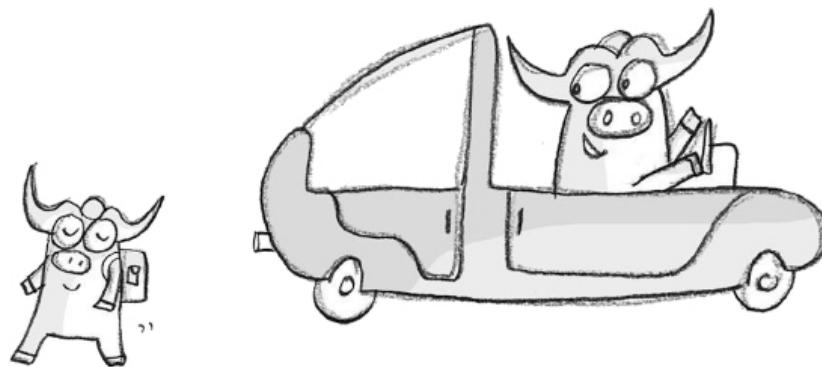
What did the buffalo say to his son at school dropoff?



● ● ● |

Punny Quiz 5 of 7

What did the buffalo say to his son at school dropoff?

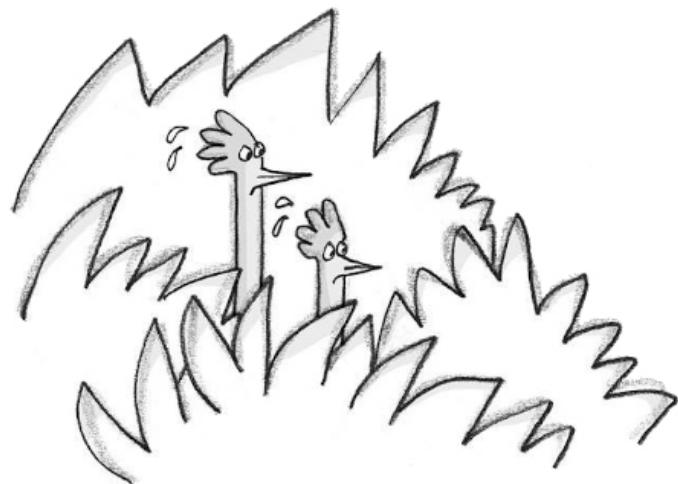


Bison.

● ● ● |

Punny Quiz 6 of 7

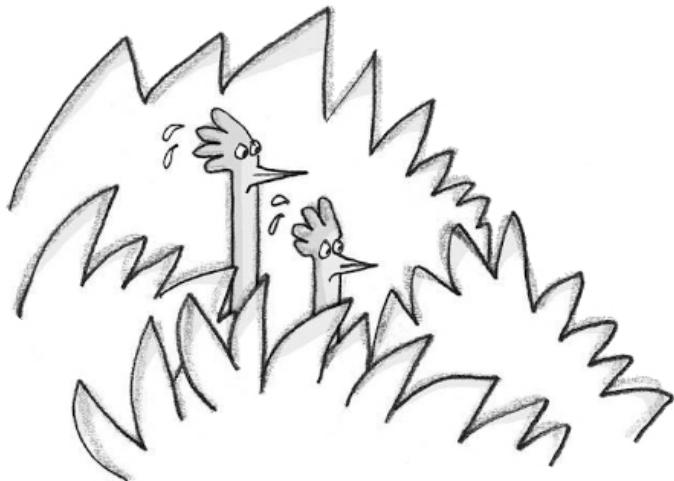
On what day of the week do chickens hide?



● ● ● |

Punny Quiz 6 of 7

On what day of the week do chickens hide?



Fry-day.

Punny Quiz 7 of 7

What was the pessimist's blood type?



Punny Quiz 7 of 7

What was the pessimist's blood type?



B-negative.

Characteristics of a Truman Student

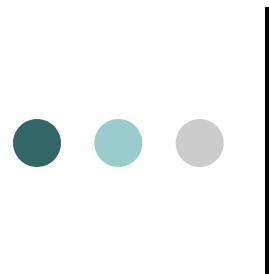
- Ask questions and passionately seek knowledge
- Strive for personal integrity and professional excellence
- Demonstrate courageous, visionary leadership qualities
- Act ethically, responsibly, and with reflective judgement
- Understand and articulate well-reasoned arguments



Characteristics of a Truman Student

- Welcome and value new and diverse perspectives
- Live emotionally and physically healthy lives; and
- Give generously of their time, talents, and financial resources to causes in which they believe.





Academic Integrity

- Do —s
 - discuss the mechanics of editing, compiling, and running a program
 - discuss the mechanics of file names, uploading
 - discuss the mechanics of using the shell, printing
 - discuss the general strategy for completing an assignment
 - use code from the instructor or the course book without reference
- Don't —s
 - look at any portion of another student's code or writeup
 - show any portion of your code or writeup to another student
 - discuss the details of any assignment, in person or electronically
 - copy code from any source except from the instructor or the course book
- Should —s
 - cite any source of ideas other than the instructor or the course book
 - this means if you looked something up on the web, you should reference that in your homework assignment

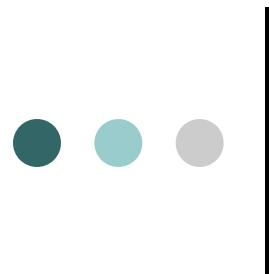


Syllabus

Lets discuss the syllabus

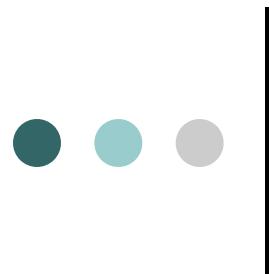
Do you have any questions?





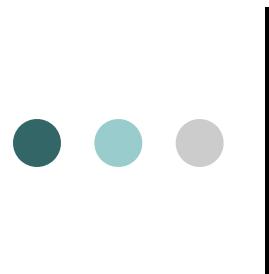
Lets Play a Kahoot! Game

- Visit <https://kahoot.it>
 - Enter the provided PIN
- Category of games
 - [Brain teaser fun](#)
 - [Compute Science Principles — variables, loops, functions, etc](#)



Foundation over CS181

- I will be assuming the following:
 - ADT
 - Constructor, accessor, mutator
 - Loops, condition
 - Mathematical and logical operators
 - Inheritance, abstract class, polymorphism
 - STL: vector, set, map, stack, queue



Number Types

- Every value in Java is either:
 - a reference to an object
 - one of the eight primitive types
- Java has eight primitive types:
 - four integer types
 - two floating-point types
 - two other

Primitive Types

Table 1 Primitive Types

Type	Description	Size
int	The integer type, with range -2,147,483,648 (<code>Integer.MIN_VALUE</code>) ... 2,147,483,647 (<code>Integer.MAX_VALUE</code> , about 2.14 billion)	4 bytes
byte	The type describing a single byte, with range -128 ... 127	1 byte
short	The short integer type, with range -32,768 ... 32,767	2 bytes
long	The long integer type, with range -9,223,372,036,854,775,808 ... 9,223,372,036,854,775,807	8 bytes
double	The double-precision floating-point type, with a range of about $\pm 10^{308}$ and about 15 significant decimal digits	8 bytes
float	The single-precision floating-point type, with a range of about $\pm 10^{38}$ and about 7 significant decimal digits	4 bytes
char	The character type, representing code units in the Unicode encoding scheme (see Computing & Society 4.2 on page 161)	2 bytes
boolean	The type with the two truth values <code>false</code> and <code>true</code> (see Chapter 5)	1 bit



Number Literals

Table 2 Number Literals in Java

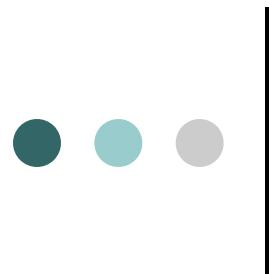
Number	Type	Comment
6	int	An integer has no fractional part.
-6	int	Integers can be negative.
0	int	Zero is an integer.
0.5	double	A number with a fractional part has type double.
1.0	double	An integer with a fractional part .0 has type double.
1E6	double	A number in exponential notation: 1×10^6 or 1000000. Numbers in exponential notation always have type double.
2.96E-2	double	Negative exponent: $2.96 \times 10^{-2} = 2.96 / 100 = 0.0296$
100000L	long	The L suffix indicates a long literal.
100,000		Error: Do not use a comma as a decimal separator.
100_000	int	You can use underscores in number literals.
3 1/2		Error: Do not use fractions; use decimal notation: 3.5



Constants: final

- Use symbolic names for all values, even those that appear obvious. A final variable is a constant
- Once its value has been set, it cannot be changed
- Named constants make programs easier to read and maintain. Convention: use all-uppercase names for constants:

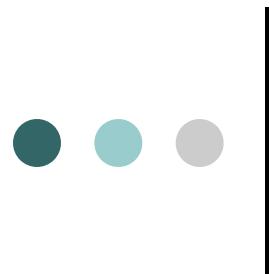
```
final double QUARTER_VALUE = 0.25;  
final double DIME_VALUE = 0.1;  
final double NICKEL_VALUE = 0.05;  
final double PENNY_VALUE = 0.01;  
  
payment = dollars + quarters * QUARTER_VALUE + dimes *  
DIME_VALUE + nickels * NICKEL_VALUE + pennies * PENNY_VALUE;
```



Hello World Program

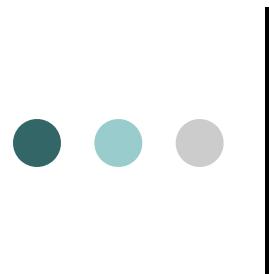
- Demo: creating your first program/project in Java

```
public class CHelloworld {  
    public static void main(String[] args) {  
  
        System.out.println("Welcome to Java!!!!");  
        int number = 500;  
        System.out.println("The number is: " + number);  
  
    }  
}
```



IntelliJ IDEA

- If students are familiar with JetBrains IDE's like PyCharm, they can consider using IntelliJ IDEA as their code editor of choice.
- Students can get a free license through their Truman student email account for a year
- Visit the following link for more information
 - <https://blog.jetbrains.com/education/2018/09/18/free-jetbrains-licenses-as-part-of-github-student-developer-pack/>



Self Check 4.3

- Which of the following initializations are incorrect, and why?
 - `int dollars = 100.0;`
 - `double balance = 100;`
- Answer: The first initialization is incorrect. The right hand side is a value of type `double`, and it is not legal to initialize an `int` variable with a `double` value. The second initialization is correct — an `int` value can always be converted to a `double`.



Questions?

