Lecture 02: Elementary Programming
Schedule

• Housekeeping

• Review from last class

• homework questions?

• Lecture content
  • Algorithms
  • Variables and data types
  • Mathematical operations
  • Read input from console
• Describes the steps of how to solve a problem in code.

• Like a recipe, you define the inputs and outputs and steps to take to get there, in order.

• Can write this as pseudocode, right in your editor as comments
public class TipCalculator {

    public static void main(String[] args) {
        // Set up variables

        // Calculate tip total

        // Add tip total to food total

        // Print out result
    }
}

}
Variables

• Represent values that may change in the program

• Variables need to be declared before they are used. You tell the computer its name and what type of data it will hold

• Syntax:    datatype variableName;

• Example:   int characterCount;

• Assignment using =

• Example:   int y = 1;

• Note: (lowercase first word, uppercase the rest)
Constants

• Will not change in your program

• Permanent data.

• Example: final double PI = 3.14159;
public class TipCalculator {

    public static void main(String[] args) {
        // Set up variables
        double subTotal = 14.37;
        double tipAmount = 20.0;
        double tipTotal;
        double total;

        // Calculate tip total

        // Add tip total to food total

        // Print out result
    }
}
Mathematical Operations

- + Addition
- - Subtraction
- * Multiplication
- / Division
- % Modulo (Remainder)
• Order of operations:
  
  • () first,
  
  • * / % next, left to right,
  
  • + - last, left to right
  
  • Tip! if you get confused, put more parens in to be explicit
public class TipCalculator {

    public static void main(String[] args) {
        // Set up variables
        double subtotal = 14.37;
        double tipAmount = 20.0;
        double tipTotal;
        double total;

        // Calculate tip total
        tipTotal = subtotal * (tipAmount / 100);
        System.out.println("Tip total: "+tipTotal);

        // Add tip total to food total
        total = subtotal + tipTotal;

        // Print out result
        System.out.println("Total bill: "+total);
    }
}
• **TIP!** Convert total to cents, then divide by 100.0 to get rounded to cents

• `total = (int) (total * 100)/100.0;`
Scanner class

• System.out is standard output device, System.in is standard input

• Console input isn't directly supported, so we can use the Scanner class to create an object that will read from System.in

• Scanner input = new Scanner(System.in);

• Creates an object of Scanner type, assigns its reference to the input variable.

• Has methods (like out classes do and will), like nextDouble()
Let's get input for the total and tip percentage

```java
import java.util.Scanner;

public class TipCalculator {

    public static void main(String[] args) {
        // Set up variables
        double subtotal;
        double tipAmount;
        double tipTotal;
        double total;
        Scanner input = new Scanner(System.in);

        // Read subtotal from console
        System.out.print("Enter the subtotal: ");
        subtotal = input.nextDouble();

        // Read tipAmount from console
        System.out.print("Enter the tip percentage (ex. 20.0): ");
        tipAmount = input.nextDouble();

        // Calculate tip total
        tipTotal = subtotal * (tipAmount / 100);
        System.out.println("Tip total: "+ tipTotal);

        // Add tip total to food total
        total = subtotal + tipTotal;
    }
}
```
Programming challenge

• Write a program that will convert Fahrenheit to Celsius

\[ C = (F - 32) \times \frac{5}{9} \]