Chapter 3: Methods/Functions
Tech News

Offline viewing of some Netflix shows now available
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Offline viewing of some Netflix shows now available

Consumer Review Fairness Act passes unanimously in the senate
Hacker's Tip of the Day

- Why is my hard drive only 1.8 TB when the box said 2 TB???
Hacker's Tip of the Day

- Hard drive manufacturers use:
  - 1 TB = 10^{12} bytes

- Computer scientists/operating systems use:
  - 1 TB = 2^{40} bytes
Hacker's Tip of the Day

- \(10^{12} = 1\,000\,000\,000\,000\)
- \(2^{40} = 1\,099\,511\,627\,776\)

- For every decimal TB, you're missing about 99 GB of space
- \(2 \times 99\,GB = 198\,GB\)
- Final drive size: \(2\,TB - 198\,GB = 1.8\,TB\)
Chapter 3: Methods/Functions

- What are methods/functions? What can they do?
- How do we write our own functions?
- How do method variables work?
- How do we get input from the user?
What is a function in mathematics?
What is a function in mathematics?

Domain

Range
What is a function in mathematics?

**Domain**

- 17
- 11

**Range**

- 17
- 11

The function is described as the **identity function**.
What is a function in mathematics?

**Domain**
- 17
- 11

**Range**
- 34
- 22

*doubleIt*
What is a function in mathematics?

**Domain**
- 17
- 11
- 6

**Range**
- **isPrime**
  - True
  - False
The Function Machine

Input

Output
The **Java** Function Machine

Input Parameters

Return Value
public int doubleIt(int singleValue) {
    ...
}
Java doubleIt Header

```java
public int doubleIt(int singleValue) {
    ...
}
```

Data type of the produced output.
public int doubleIt(int singleValue) {
    ...
}

Name of our function.
public int doubleIt(int singleValue) {
    ...
}

The input parameter list. Just a single input value for this function.
Java doubleIt Output

```java
public int doubleIt(int singleValue) {
    ...
    return doubleValue;
}
```

`return` actually produces an output for the function.
public int doubleIt(int singleValue) {
    ...
    return doubleValue;
}
public int doubleIt(int singleValue) {
    int doubleValue = 2 * singleValue;
    return doubleValue;
}
The scope of this variable is local to the doubleIt method.
Exercise: Write Two Functions

The carPayment function: takes as input the starting price of a new car, the down payment, and the loan term in months and produces as output the monthly payment (with no interest).

The daysToSeconds function: takes as input a number of days and produces as output the number of seconds in that many days.
**void** Functions
(Sometimes called **procedures**)

```java
public void printHello() {
    System.out.println("Hello, world!");
}
```
Exercise 2.0: Write Function Headers

String's `length` method

Graphics's `setColor` and `fillRect` methods

System's `println` method
Mathematical Operators - Increment

```plaintext
x = x + 1;
```
Mathematical Operators - Increment

x++;
Mathematical Operators - Increment

```
x += 1;
```
Mathematical Operators - Decrement

\[ x = x - 1; \]

\[ x--; \]

\[ x -= 1; \]
Mathematical Methods

\( \sin(x) \) – sine of \( x \)
\( \cos(x) \) – cosine of \( x \)
\( \tan(x) \) – tangent of \( x \)

\( \text{pow}(x, y) \) – raise \( x \) to the power of \( y \)
\( \log(x) \) – natural log of \( x \)

\( \text{round}(x) \) – round \( x \) to nearest integer

\( \text{abs}(x) \) – get the absolute value of \( x \)

\( \text{ceil}(x) \) – round \( x \) up to the nearest integer
\( \text{floor}(x) \) – round \( x \) down to the nearest integer
int theSin = Math.sin(angle);
int theSin = \texttt{Math.sin}(\texttt{angle});
// Convert a String into an integer
String userAgeString = "23";

int userAge = Integer.parseInt(userAgeString);
// Convert a String into an integer
String userAgeString = "23";
int userAge = Integer.parseInt(userAgeString);

// Convert a String into a double
String gpaString = "3.42";
double gpa = Double.parseDouble(gpaString);
More String Methods

// Extract a single character from a String
String fullName = "Stephanie Brown";
char firstLetter = fullName.charAt(0);
// Extract a single character from a String
String fullName = "Stephanie Brown";
char firstLetter = fullName.charAt(0);

// Extract the first nine characters from a String
String fullName = "Stephanie Brown"
String firstName = fullName.substring(0, 9);
More String Methods

// Extract a single character from a String
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char firstLetter = fullName.charAt(0);

// Extract the first nine characters from a String
String fullName = "Stephanie Brown";
String firstName = fullName.substring(0, 9);

Inclusive start index
More String Methods

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// Extract the first nine characters from a String
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String firstName = fullName.substring(0, 9);

Exclusive end index
Escape Sequences

// Insert a newline character
System.out.println("Hello \n World");
// Insert a newline character
System.out.println("Hello \n World");

// Insert a literal backslash (\)
System.out.println("Saved in C:\\Documents");
Getting User Input

// Create a Scanner object
Scanner myScanner = new Scanner(System.in);

// Read in an integer that the user types in
int userInt = myScanner.nextInt();
// Create a Scanner object
Scanner myScanner = new Scanner(System.in);

// Read in an integer that the user types in
int userInt = myScanner.nextInt();

// Read in a whole line as a String
String line = myScanner.nextLine();
// Create a pop-up window
String prompt = "Please enter your username";
String username = JOptionPane.showInputDialog(prompt);
// Create a pop-up window
String prompt = "Please enter your username";
String username = JOptionPane.showInputDialog(prompt);

String prompt2 = "Please enter your password";
String password = JOptionPane.showInputDialog(prompt2);
// Create a pop-up window
String prompt = "Please enter your username";
String username = JOptionPane.showInputDialog(prompt);

String prompt2 = "Please enter your password";
String password = JOptionPane.showInputDialog(prompt2);

JOptionPane.showMessageDialog(null, "Logged in!");
BetterCalculator.java
BREAK!