Control Flow Revisited
Chris Piech
CS106A, Stanford University
Review
Java

Piech, CS106A, Stanford University
Making a New Variable

```
int age = 29;
```
My computer has space for about 2 billion boxes
/\ Create a variable, of type int
/\ called age with the value 29.
\*int\ age = 29;

/\ Modify age to be one greater.
age = age + 1;

/\ Use the value in age (output it)
println("age is: " + age);

public class Receipt extends ConsoleProgram {
    public void run() {
        double subtotal = readDouble("Meal cost? $");
        double tax = subtotal * 0.08;
        double tip = subtotal * 0.20;
        double total = subtotal + tax + tip;

        println("Tax : $" + tax);
        println("Tip: $" + tip);
        println("Total: $" + total);
    }
}
• **constant**: A variable that cannot be changed after it is initialized. Declared at the top of your class, *outside of the run() method*. Can be used anywhere in that class.

• Better style – can easily change their values in your code, and they are easier to read in your code.

• **Syntax:**

```java
private static final type name = value;
```

– name is usually in **ALL_UPPER_CASE**

– Examples:

```java
private static final int DAYS_IN_WEEK = 7;
private static final double TAX_PERCENT = 0.08;
private static final int SSN = 658234569;
```
public class Receipt extends ConsoleProgram {
    public void run() {
        double subtotal = readDouble("Meal cost? $");
        double tax = subtotal * 0.08;
        double tip = subtotal * 0.20;
        double total = subtotal + tax + tip;

        println("Tax : $" + tax);
        println("Tip: $" + tip);
        println("Total: $" + total);
    }
}

public class Receipt extends ConsoleProgram {
    private static final double TAX_RATE = 0.08;
    private static final double TIP_RATE = 0.2;

    public void run() {
        double subtotal = readDouble("Meal cost? $");
        double tax = subtotal * TAX_RATE;
        double tip = subtotal * TIP_RATE;
        double total = subtotal + tax + tip;

        println("Tax : "+ tax);
        println("Tip: "+ tip);
        println("Total: "+ total);
    }
}
Cool Example: Carbon Dating

Write a program that can turn a measurement of C14 into an estimate of age.

Radioactive molecule = C14
Halflife = 5730 years
C14 in living organisms = 13.6 dpm

What is the amount of C14 remaining in your sample: 10.2
Your sample is 2378.0 years old.
Example: Carbon Dating

C14 = 1.2 dpm

C14 = 13.6 dpm
Carbon Dating Equation

\[
\text{age} = \frac{\log\left(\frac{c}{13.6}\right)}{\log\left(\frac{1}{2}\right)} \times 5730
\]

- **Amount of C14 in your sample**
- **Fraction of C14 left**
- **Age of the sample**
- **½ because of half life convention**
- **Half life of C14**

* Some of these values are constants
** Use the function: Math.log( num )
Today is your day, tio
// an example of the % operator
println(17 % 4);

// reads a number from the user
int num = readInt("?: ");

// stores the ones digit
int onesDigit = num % 10;

// equal to 1 if num is odd,
// 0 if num is even.
int isOdd = num % 2;
End Review
Today’s Goal

1. Be able to use For / While / If in Java
While Loop in Karel

```java
while(frontIsClear()) {
    body
}
```

```java
if(beepersPresent()) {
    body
}
```
While Loop Redux

```plaintext
while(condition) {
    body
}

if(condition) {
    body
}
```

The condition should be a "boolean" which is either `true` or `false`
// read the amount of C14 from the user
double amount = readDouble("Amount of C14 in your sample: ");

// use the half life formula to calculate the age
double fractionLeft = amountLeft / LIVING_C14;
double age = Math.log(fractionLeft) / Math.log(0.5) * HALF_LIFE;
println("Your sample is " + age + " years old.");

* It calculates the age of a C14 sample
While this statement evaluates as true, the program will repeat the body of the loop.

```java
while(true) {
    // read the amount of C14 from the user
    double amount = readDouble("Amount of C14 in your sample: ");

    // use the half life formula to calculate the age
    double fractionLeft = amountLeft / LIVING_C14;
    double age = Math.log(fractionLeft) / Math.log(0.5) * HALF_LIFE;
    println("Your sample is " + age + " years old.");

    // add an extra line between queries
    println("\n");
}
```

* It repeatedly calculates the age of a C14 sample
Booleans

1 < 2
Booleans

1 < 2

true
## Comparison Operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Meaning</th>
<th>Example</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>==</td>
<td>equals</td>
<td>1 + 1 == 2</td>
<td>true</td>
</tr>
<tr>
<td>!=</td>
<td>does not equal</td>
<td>3.2 != 2.5</td>
<td>true</td>
</tr>
<tr>
<td>&lt;</td>
<td>less than</td>
<td>10 &lt; 5</td>
<td>false</td>
</tr>
<tr>
<td>&gt;</td>
<td>greater than</td>
<td>10 &gt; 5</td>
<td>true</td>
</tr>
<tr>
<td>&lt;=</td>
<td>less than or equal to</td>
<td>126 &lt;= 100</td>
<td>false</td>
</tr>
<tr>
<td>&gt;=</td>
<td>greater than or equal to</td>
<td>5.0 &gt;= 5.0</td>
<td>true</td>
</tr>
</tbody>
</table>

* All have equal precedence
# Comparison Operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Meaning</th>
<th>Example</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>==</code></td>
<td>equals</td>
<td><code>1 + 1 == 2</code></td>
<td>true</td>
</tr>
<tr>
<td><code>!=</code></td>
<td>does not equal</td>
<td><code>3.2 != 2.5</code></td>
<td>true</td>
</tr>
<tr>
<td><code>&lt;</code></td>
<td>less than</td>
<td><code>10 &lt; 5</code></td>
<td>false</td>
</tr>
<tr>
<td><code>&gt;</code></td>
<td>greater than</td>
<td><code>10 &gt; 5</code></td>
<td>true</td>
</tr>
<tr>
<td><code>&lt;=</code></td>
<td>less than or equal to</td>
<td><code>126 &lt;= 100</code></td>
<td>false</td>
</tr>
<tr>
<td><code>&gt;=</code></td>
<td>greater than or equal to</td>
<td><code>5.0 &gt;= 5.0</code></td>
<td>true</td>
</tr>
</tbody>
</table>

* All have equal precedence
```java
if (1 < 2) {
    println("1 is less than 2! ");
}

int num = readInt("Enter a number: ");
if (num == 0) {
    println("That number is 0! ");
} else {
    println("That number is not 0. ");
}
```
int num = readInt("Enter a number: ");
if (num == 0) {
    println("Your number is 0 ");
} else {
    if (num > 0) {
        println("Your number is positive");
    } else {
        println("Your number is negative");
    }
}
int num = readInt("Enter a number: ");
if (num == 0) {
    println("Your number is 0 ");
} else if (num > 0) {
    println("Your number is positive");
} else {
    println("Your number is negative");
}
Example: Sentinel Loops

• **sentinel**: A value that signals the end of user input.
  – **sentinel loop**: Repeats until a sentinel value is seen.

• Example: Write a program that prompts the user for numbers until the user types -1, then output the sum of the numbers.
  – In this case, -1 is the sentinel value.

  Type a number: 10
  Type a number: 20
  Type a number: 30
  Type a number: -1
  Sum is 60
// fencepost problem!
// ask for number - post
// add number to sum - fence

```java
int sum = 0;
int num = readInt("Enter a number: ");
while (num != -1) {
    sum += num;
    num = readInt("Enter a number: ");
}
println("Sum is " + sum);
```
Example: Sentinel Loops

// Solution #2
// harder to see loop end condition here

int sum = 0;
while (true) {
    int num = readInt("Enter a number: ");
    if (num == -1) {
        break; // immediately exits loop
    }
    sum += num;
}
println("Sum is " + sum);
Guess My Number

I am thinking of a number between 0 and 99...
Enter a guess: 50
Your guess is too high

Enter a new number: 25
Your guess is too low

Enter a new number: 40
Your guess is too low

Enter a new number: 45
Your guess is too low

Enter a new number: 48
Congrats! The number was: 48
Guess My Number

```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```

secretNumber = 92
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
}
println(" "); // an empty line
guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
Guess My Number

```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
}
println(""); // an empty line
guess = readInt("Enter a new number: ");
println("Congrats! The number was: " + secretNumber);
```

50

92

guess

secretNumber
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
  // true if guess is less than secret number
  if(guess < secretNumber) {
    println("Your guess is too low");
  } else {
    println("Your guess is too high");
  }
  println(" "); // an empty line
  guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+secretNumber);

50

guess

92

secretNumber
Guess My Number

```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```

50

guess

92

secretNumber
Guess My Number

```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
}
println("\n"); // an empty line
guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```
```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println("\n"); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```
```java
import java.util.Scanner;

public class GuessMyNumber {
    public static void main(String[] args) {
        int secretNumber = getHeight() % 100;
        System.out.println("I am thinking of a number between 0 and 99...");
        int guess = readInt("Enter a guess: ");
        // true if guess is not equal to secret number
        while (guess != secretNumber) {
            // true if guess is less than secret number
            if (guess < secretNumber) {
                System.out.println("Your guess is too low");
            } else {
                System.out.println("Your guess is too high");
            }
            System.out.println("" ); // an empty line
            guess = readInt("Enter a new number: ");
        }
        System.out.println("Congrats! The number was: " + secretNumber);
    }

    public static int getHeight() {
        return 50; // arbitrary height
    }

    public static int readInt(String prompt) {
        System.out.print(prompt);
        Scanner scanner = new Scanner(System.in);
        return scanner.nextInt();
    }
}
```

int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println("\n"); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+secretNumber);
```
```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println("\n"); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while (guess != secretNumber) {
    // true if guess is less than secret number
    if (guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: " + secretNumber);
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
}
println(" "); // an empty line
guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: " + secretNumber);
```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: " + secretNumber);
```

<table>
<thead>
<tr>
<th>guess</th>
<th>secretNumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>92</td>
</tr>
</tbody>
</table>
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println("\n"); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: " + secretNumber);
```java
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99... ");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" ");
    // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
```
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
    // true if guess is less than secret number
    if(guess < secretNumber) {
        println("Your guess is too low");
    } else {
        println("Your guess is too high");
    }
    println(" "); // an empty line
    guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: "+ secretNumber);
int secretNumber = getHeight() % 100;
println("I am thinking of a number between 0 and 99...");
int guess = readInt("Enter a guess: ");
// true if guess is not equal to secret number
while(guess != secretNumber) {
  // true if guess is less than secret number
  if(guess < secretNumber) {
    println("Your guess is too low");
  } else {
    println("Your guess is too high");
  }
  println(" "); // an empty line
  guess = readInt("Enter a new number: ");
}
println("Congrats! The number was: " + secretNumber);

```
# Guess My Number

```java
import java.util.Scanner;

public class GuessNumber {
    public static void main(String[] args) {
        int secretNumber = getHeight() % 100;
        System.out.println("I am thinking of a number between 0 and 99...");
        int guess = readInt("Enter a guess: ");

        // true if guess is not equal to secret number
        while(guess != secretNumber) {
            // true if guess is less than secret number
            if(guess < secretNumber) {
                System.out.println("Your guess is too low");
            } else {
                System.out.println("Your guess is too high");
            }
        }

        System.out.println("Congrats! The number was: "+ secretNumber);
    }

    public static int getHeight() {
        return 55; // Replace with actual height function
    }

    public static int readInt(String prompt) {
        Scanner scanner = new Scanner(System.in);
        System.out.print(prompt);
        return scanner.nextInt();
    }
}
```

```
92
```

```java
// guess = 92
```
**Logical Operators**

In order of precedence:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>not</td>
<td>!(2 == 3)</td>
<td>true</td>
</tr>
<tr>
<td>&amp;&amp;</td>
<td>and</td>
<td>(2 == 3) &amp;&amp; (-1 &lt; 5)</td>
<td>false</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>or</td>
</tr>
</tbody>
</table>

Cannot "chain" tests as in algebra; use && or || instead

// assume x is 15
2 <= x <= 10
true  <= 10
Error!

// correct version
2 <= x && x <= 10
true  && false
false
Precedence Madness

Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 - 1) && !false
Precedence Madness

Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 - 1) && !false
5 * 7 >= 3 + 5 * 6 && !false
Precedence Madness

Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 - 1) && !false
5 * 7 >= 3 + 5 * 6 && !false
5 * 7 >= 3 + 5 * 6 && true
Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 – 1) && !false
5 * 7 >= 3 + 5 * 6 && !false
5 * 7 >= 3 + 5 * 6 && true
35 >= 3 + 30 && true
Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 - 1) && !false
5 * 7 >= 3 + 5 * 6 && !false
5 * 7 >= 3 + 5 * 6 && true
35 >= 3 + 30 && true
35 >= 33 && true
Precedence Madness

Precedence:

! > arithmetic > comparison > logical

\[ 5 \times 7 \geq 3 + 5 \times (7 - 1) \land \lnot \text{false} \]
\[ 5 \times 7 \geq 3 + 5 \times 6 \land \lnot \text{false} \]
\[ 5 \times 7 \geq 3 + 5 \times 6 \land \text{true} \]
\[ 35 \geq 3 + 30 \land \text{true} \]
\[ 35 \geq 33 \land \text{true} \]
\[ \text{true} \land \text{true} \]
Precedence Madness

Precedence:

! > arithmetic > comparison > logical

5 * 7 >= 3 + 5 * (7 - 1) && !false
5 * 7 >= 3 + 5 * 6 && !false
5 * 7 >= 3 + 5 * 6 && true
35 >= 3 + 30 && true
35 >= 33 && true
true && true
true

Never write code like this 😊
George Boole

English Mathematician 1815 – 1864
Boole died of being too cool

Piech, CS106A, Stanford University
// Store expressions that evaluate to true/false
boolean x = 1 < 2;       // true
boolean y = 5.0 == 4.0;  // false
// Store expressions that evaluate to true/false
boolean x = 1 < 2;  // true
boolean y = 5.0 == 4.0;  // false

// Directly set to true/false
boolean isFamilyVisiting = true;
boolean isRaining = false;
// Store expressions that evaluate to true/false
boolean x = 1 < 2;  // true
boolean y = 5.0 == 4.0;  // false

// Directly set to true/false
boolean isFamilyVisiting = true;
boolean isRaining = false;

// Ask the user a true/false (yes/no) question
boolean playAgain = readBoolean("Play again?", "y", "n");
if (playAgain) {
...
Please...

NO FOOD OR DRINKS

*know your logical precedence
Today’s Route

- Review
- Conditions
- For Loops
- Game Show
- Simple Java

You are here

The River of Java

Piech, CS106A, Stanford University
How would you println “Stanford rocks socks” 100 times
public void run() {
    for (int i = 0; i < 100; i++) {
        println("Stanford rocks socks!");
    }
}
For Loop Redux

```java
for (int i = 0; i < 100; i++) {
    println("Stanford rocks socks!");
}
```

- This line is run once, just before the for loop starts.
- Enters the loop if this condition passes.
- This line is run each time the code gets to the end of the 'body.'
for (int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
For Loop Redux

```java
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```
For Loop Redux

\[
\begin{array}{c|c}
\text{i} & \text{0} \\
\end{array}
\]

\begin{verbatim}
for (int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
\end{verbatim}
For Loop Redux

for (int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}

Stanford rocks socks
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

```
For Loop Redux

Stanford rocks socks
```
For Loop Redux

```
for (int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

Stanford rocks socks
For Loop Redux

\[
\begin{array}{|c|}
\hline
i & 1 \\
\hline
\end{array}
\]

```java
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

Piech, CS106A, Stanford University
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

Piech, CS106A, Stanford University
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

```
For Loop Redux

Stanford rocks socks
Stanford rocks socks
```
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

`i` | 2
For Loop Redux

```java
for (int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

Output:
Stanford rocks socks
Stanford rocks socks
Stanford rocks socks
For Loop Redux

```
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
```

Stanford rocks socks
Stanford rocks socks
Stanford rocks socks
for(int i = 0; i < 3; i++) {
    println(“Stanford rocks socks!”);
}
for(int i = 0; i < 3; i++) {
    println("Stanford rocks socks!");
}
You can use the for loop variable
How would you println the first 100 even numbers?
Printing Even Numbers

0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Printing Even Numbers

```java
for(int i = 0; i < NUM_NUMS; i++) {
    println(i * 2);
}
```
Printing Even Numbers

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```
### Printing Even Numbers

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```
Printing Even Numbers

for (int i = 0; i < 3; i++) {
    println(i * 2);
}
Printing Even Numbers

\[
\begin{array}{c|c}
 i & 0 \\
\end{array}
\]

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

Piech, CS106A, Stanford University
Printing Even Numbers

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

0
Printing Even Numbers

\[ \text{for (int } i = 0; i < 3; i++) { } \]

\[ \text{println}(i \times 2); \]
Printing Even Numbers

for (int i = 0; i < 3; i++) {
    println(i * 2);
}
Printing Even Numbers

```
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

For Loop Redux

0
2
Printing Even Numbers

```java
for (int i = 0; i < 3; i++) {
    println(i * 2);
}
```

Output:

```
0
2
```
Printing Even Numbers

for (int i = 0; i < 3; i++) {
    println(i * 2);
}

Piech, CS106A, Stanford University
Printing Even Numbers

$i \quad 2$

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

For Loop Redux

0
2
4
Printing Even Numbers

for (int i = 0; i < 3; i++) {
    println(i * 2);
}

0
2
4
Printing Even Numbers

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

For Loop Redux

```
0
2
4
```
Printing Even Numbers

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

Output:
```
0
2
4
```
Printing Even Numbers

```java
for(int i = 0; i < 3; i++) {
    println(i * 2);
}
```

Output:

```
0
2
4
```
Today’s Route

- Review
- Conditions
- For Loops
- Game Show

You are here

Simple Java

The River of Java
Welcome to the CS106A game show!
Choose a door and win a prize
Door: 2
You chose door 2
You win $[hidden]
Choose a Door

```java
int door = readInt("Door: ");
// while the input is invalid
while (door < 1 || door > 3) {
    // tell the user the input was invalid
    println("Invalid door! ");
    // ask for a new input
    door = readInt("Door: ");
}
```

|| or
&& and
int prize = 4;
if (door == 1) {
    prize = 2 + 9 / 10 * 100;
} else if (door == 2) {
    boolean locked = prize % 2 != 0;
    if (!locked) {
        prize += 6;
    }
} else if (door == 3) {
    prize++;
}
int prize = 4;
if (door == 1) {
    prize = 2 + 9 / 10 * 100;
} else if (door == 2) {
    boolean locked = prize % 2 != 0;
    if (!locked) {
        prize += 6;
    }
} else if (door == 3) {
    prize++;
}
The Door Logic

```java
int prize = 4;
if (door == 1) {
    prize = 2 + 9 / 10 * 100;
} else if (door == 2) {
    boolean locked = prize % 2 != 0;
    if (!locked) {
        prize += 6;
    }
} else if (door == 3) {
    prize++;
}
```
The Door Logic

```java
int prize = 4;
if (door == 1) {
    prize = 2 + 9 / 10 * 100;
} else if (door == 2) {
    boolean locked = prize % 2 != 0;
    if (!locked) {
        prize += 6;
    }
    prize += 6;
} else if (door == 3) {
    prize++;
}
```
```java
int prize = 4;
if (door == 1) {
    prize = 2 + 9 / 10 * 100;
} else if (door == 2) {
    boolean locked = prize % 2 != 0;
    if (!locked) {
        prize += 6;
    }
} else if (door == 3) {
    prize++;  
}
```
Today’s Goal

1. Be able to use For / While / If in Java