4 Conditionals & Loops

**Conditionals** allow you to make decisions

**Loops** allow repetition

If I'm feeling tired then

sleep some more if do this

else

go attend a class — do that

**JAVA**

```java
if (<condition>) {
  <do this>
}
```

else

```java
if (<condition>)
  <do this>

else
  <do that>
```

**Example**

```java
int x = Integer.parseInt(arg[0]);
if (x < 0) {-5
  x = -x;
}
```
4 Conditionals: if and if-else statements

```java
int x = 3
int y = 7

if (x < y) {
    int t = x;
    x = y;
    y = t;
}

x = ?
y = 3
```

Another Example

```java
isLeapYear = (year % 4 == 0); // isLeapYear = isLeapYear && (year % 100 != 0);
isLeapYear = isLeapYear || (year % 400 == 0);
if (isLeapYear) { // (isLeapYear == true)
    System.out.println(year + " is a leap year");
} else {
    System.out.println(year + " is not a leap year");
}
```

```java
if (((year % 4 == 0) && (year % 100 != 0)) || (year % 400 == 0)) { // is a leap year
    System.out.println(year + " is a leap year");
} else { // not a leap year
    System.out.println(year + " is not a leap year");
}
```
Simulate the tossing of a coin and print heads/tails.

**Input:** None
**Output:** heads/tails

```java
Math.random() \rightarrow [0.0 .. 1)
```

- 0.0 \( \leq \) 0.5 \( \quad \) heads
- 0.5 \( < \) 0.99 \( \quad \) tails

```java
if (Math.random() < 0.5) { heads
```
Write a program that takes a month (numbered 1-12) and a year and outputs the number of days in that month.

Thirty days hath September,
April, June, and November,
All the rest have thirty-one,
But February's twenty-eight,
The LEAP YEAR, which comes once in four,
Gives February one day more.

From <https://en.wikipedia.org/wiki/Thirty_Days_Hath_September>

```java
int month = Integer.parseInt(args[0]);
int year = Integer.parseInt(args[1]);

if ((month == 4) || (month == 6) || (month == 9) || (month == 11))
    // 30

if (month == 2)
    // 29
    if (year % 4 == 0)
        // 29

else
    // 31
```

4 If and if-else Statements: More Examples

Tuesday, September 22, 2020  2:01 PM
while I'm not tired do the following

```
JAVA
while ( <condition> )
  <do this>
```

```
outcome = 0
while ( outcome != 6)
  outcome = "roll dice"
```

```
do something 10 times
int count = 0;
while (count < 10)
  System.out.println("I will not party without you");
  count = count + 1;
```
for loop

```
for ( <initialization> ; <condition> ; <update> )
  <do this>
```

```
for ( int count = 0 ; count < n ; count = count + 1 )
  System.out.println(“” + count + “”);
```

```
int count = 0;
while ( count < n )
  System.out.println(“” + count + “”);
  count = count + 1;
```

Loops
- loop initialization
- loop condition
- loop body [starts repeated]
- loop update

Compute the sum $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$

```
int sum = 0;
for ( int i = 1 ; i <= n ; i++ )
  sum = sum + i;
```

$\rightarrow$ sum