

Wednesday March 6  
Lecture 16

# Constructors

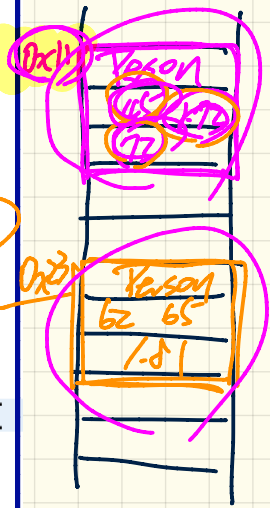
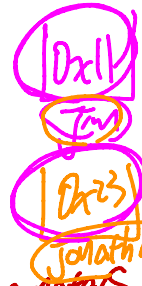
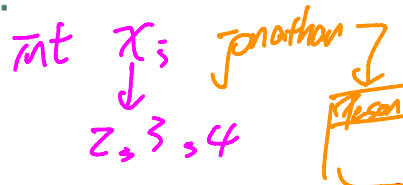
```
public class Person {
```

```
/*
 * Attributes.
 * These are variable declared at the class level.
 * All methods may use them.
 */
```

```
int age;
String nationality;
double weight; /* kg */
double height; /* meters */
```

```
/*
 * Constructors.
 */
```

```
public Person(int newAge, double newWeight, double newHeight) {
    age = newAge;
    weight = newWeight;
    height = newHeight;
}
```



Input parameters

Person Jim = new Person(.);

```
public class Tester {
```

```
public static void main(String[] args) {
    Person jim = new Person(45, 72, 1.72);
    Person jonathan = new Person(62, 65, 1.81);
}
```

Jim == jonathan false

# Constructors using this keyword

```
public class Person {  
    /*  
    * Attributes  
    */  
    int age;  
    String nationality;  
    double weight; /* kg */  
    double height; /* meters */  
  
    /*  
    * Constructors  
    */  
    Person (int age, double weight, double height) {  
        this.age = age;  
        this.weight = weight;  
        this.height = height;  
    }  
}
```

*this.age = 45;*  
*this.age = 62;*

*Jim* →

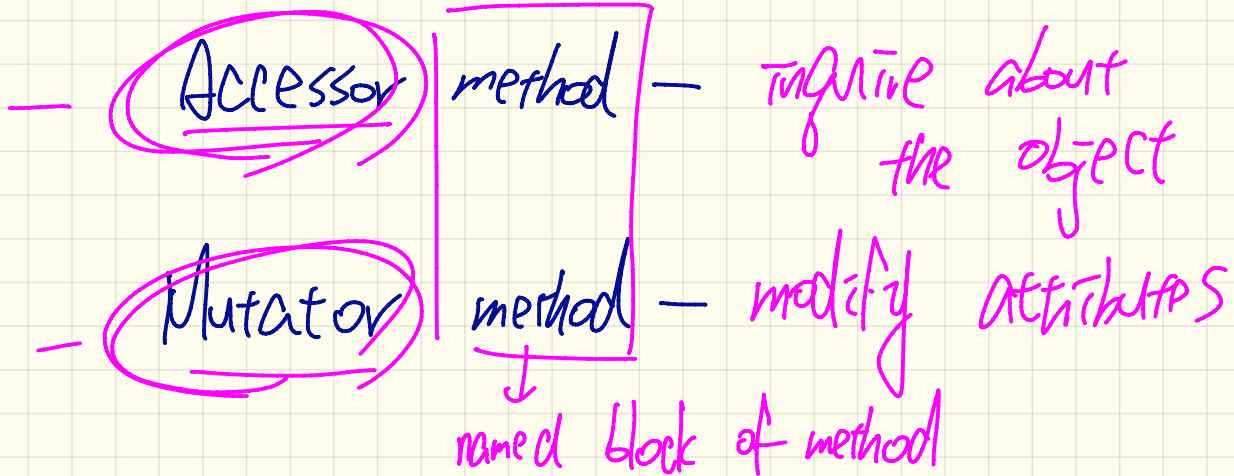
Person	
A.	45
N.	.
W.	72
H.	1.72

→ *Jonathan*

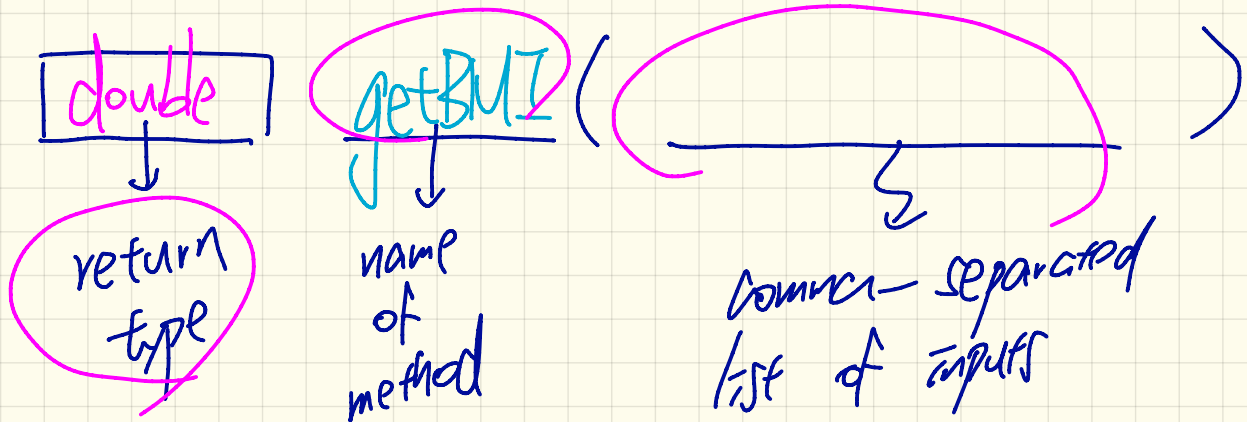
Person	
A.	62
N.	.
W.	65
H.	1.81

```
public static void main(String[] args) {  
    → Person jim = new Person (45, 72, 1.72);  
    → Person jonathan = new Person (62, 65, 1.81);  
}
```

Constructor - create new objects



# Method (accessor/mutator)



# Accessors

```

public class Person {
    /*
     * Attributes
     */
    int age;
    String nationality;
    double weight; /* kg */
    double height; /* meters */

    /*
     * Accessors
     */
    double getBMI() {
        double bmi = this.weight / (this.height * this.height);
        return bmi;
    }
}
    
```

Handwritten notes and diagrams around the code:

- Arrows point from `weight` and `height` to `Jim` and `Jonathan` respectively.
- Handwritten values: `72` (circled), `62` (circled), `1.72`, `1.72`.
- Text: "address of Person object", "locate the object in memory", "read the object".
- Arrows point from `getBMI()` to `Jim` and `Jonathan`.

Person	
A.	45
N.	
W.	72
H.	1.72

Handwritten notes: "Jim" with an arrow pointing to the table.

Person	
A.	62
N.	
W.	65
H.	1.81

Handwritten notes: "Jonathan" with an arrow pointing to the table.

```

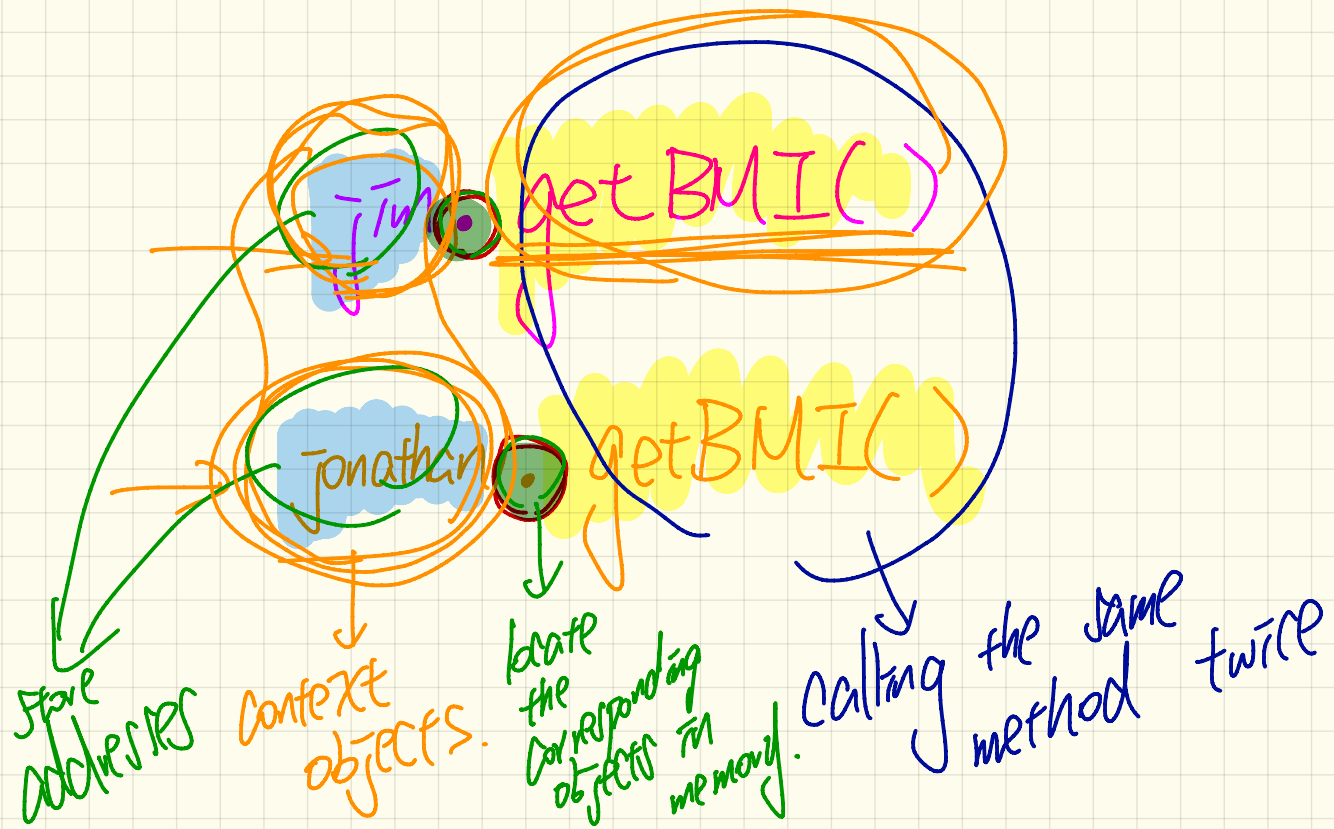
public class PersonTester {

    public static void main(String[] args) {
        Person jim = new Person(45, 72, 1.72);
        Person jonathan = new Person(62, 65, 1.81);

        double jimBMI = jim.getBMI();
        double jonathanBMI = jonathan.getBMI();
        System.out.println("Jim's BMI: " + jimBMI);
        System.out.println("Jonathan's BMI: " + jonathanBMI);
    }
}
    
```

Handwritten notes and annotations on the code:

- Arrows point to `double jimBMI = jim.getBMI();` and `double jonathanBMI = jonathan.getBMI();`.
- Handwritten `C.O.` (Class Object) above `jim.getBMI()`.
- Handwritten `1.72` and `1.72` below the BMI calculations.
- Handwritten `72` and `62` circled in pink.
- Handwritten `Jonathan` circled in green.



Store addresses

Context objects.

create the corresponding objects in memory.

calling the same method twice

# Mutators

```
public class Person {
    int age;
    String nationality;
    double weight; /* kg */
    double height; /* meters */

    double getBMI() {
        double bmi = this.weight / (this.height * this.height);
        return bmi;
    }

    void gainWeight(double amount) {
        this.weight = this.weight + amount;
    }
}
```

75  
 Jim weight =  
 Jim.weight + 3  
 72  
 Jonathan.weight =  
 Jonathan.weight + 3  
 65 68

Jim

Person	
a.	45
n.	
w.	72
h.	1.72

Jonathan

Person	
a.	62
n.	
w.	68
h.	1.81

```
Person jim = new Person(45, 72, 1.72);
Person jonathan = new Person(62, 65, 1.81);

double jimBMI = jim.getBMI();
double jonathanBMI = jonathan.getBMI();
System.out.println("Jim's BMI: " + jimBMI);
System.out.println("Jonathan's BMI: " + jonathanBMI);

jim.gainWeight(3);
jonathan.gainWeight(3);

jimBMI = jim.getBMI();
jonathanBMI = jonathan.getBMI();
System.out.println("Jim's BMI: " + jimBMI);
System.out.println("Jonathan's BMI: " + jonathanBMI);
```

this middle mutator call will change the return value of bmi

3 3  
 Jim Jonathan  
 Jim Jonathan  
 3

bmi

75

68  
 bmi

3  
 3  
 3