COMPUTER SCIENCE DEPARTMENT FACULTY OF ENGINEERING AND TECHNOLOGY

ADVANCED PROGRAMMING COMP231

Instructor :Farid Mohammad

Top 10 Reasons to Learn Java

1. Java's Popularity and High Salary
2. Java is Easy to Learn
3. Java has a Large Community
4. Java has an abundant API
5. Java has multiple Open Source Libraries
6. Java has Powerful Development Tools
7. Java is Free of Cost
8. Java is Platform Independent
9. Java has great Documentation Support
10. Java is Versatile

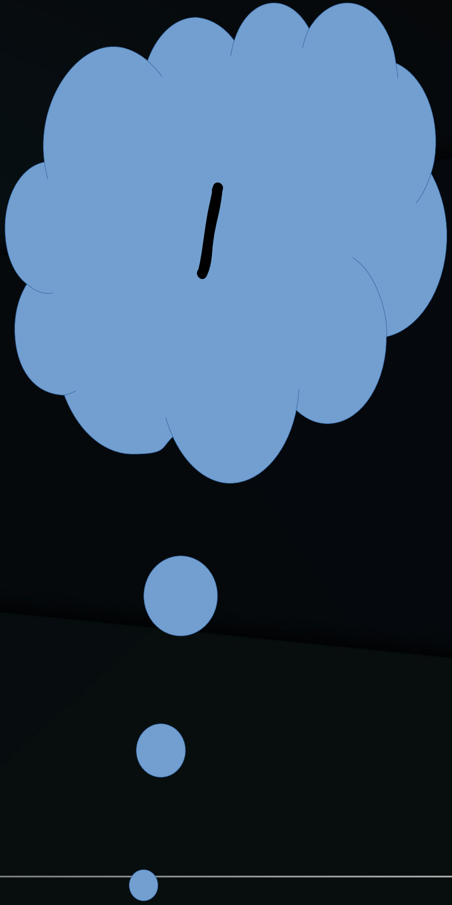
Reference:

https://www.geeksforgeeks.org/top-10-reasons-to-learn-java/

What you’ll do in Java

```
import java.awt.*;
import java.awt.event.*;
class Party {
public void buildInvite() {
Frame f = new Frame();
Label l = new Label(“Party at
Tim’s”);
Button b = new Button(“You bet”);
Button c = new Button(“Shoot
me”);
Panel p = new Panel();
p.add(l);
} // more code here...
}
```

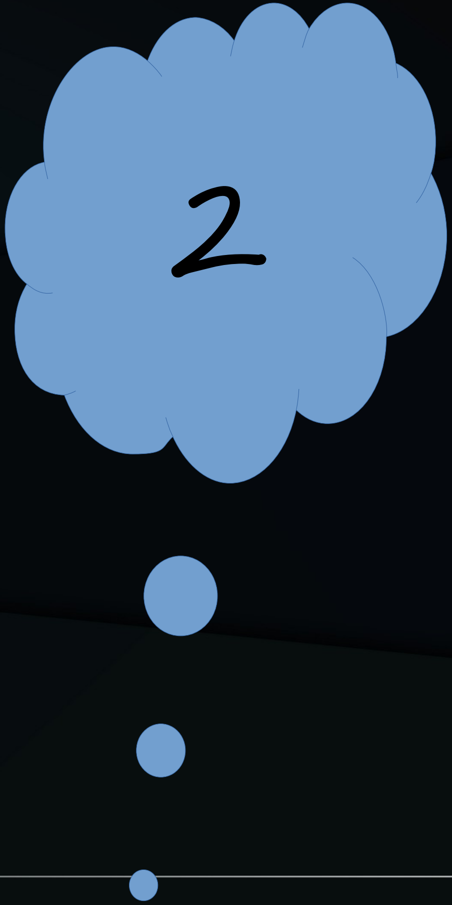
SOURCE



What you’ll do in Java

```
%javac Party.java
```

Compiler



What you'll do in Java

Compiled code:
Party.class

Output
(code)

What you'll do in Java

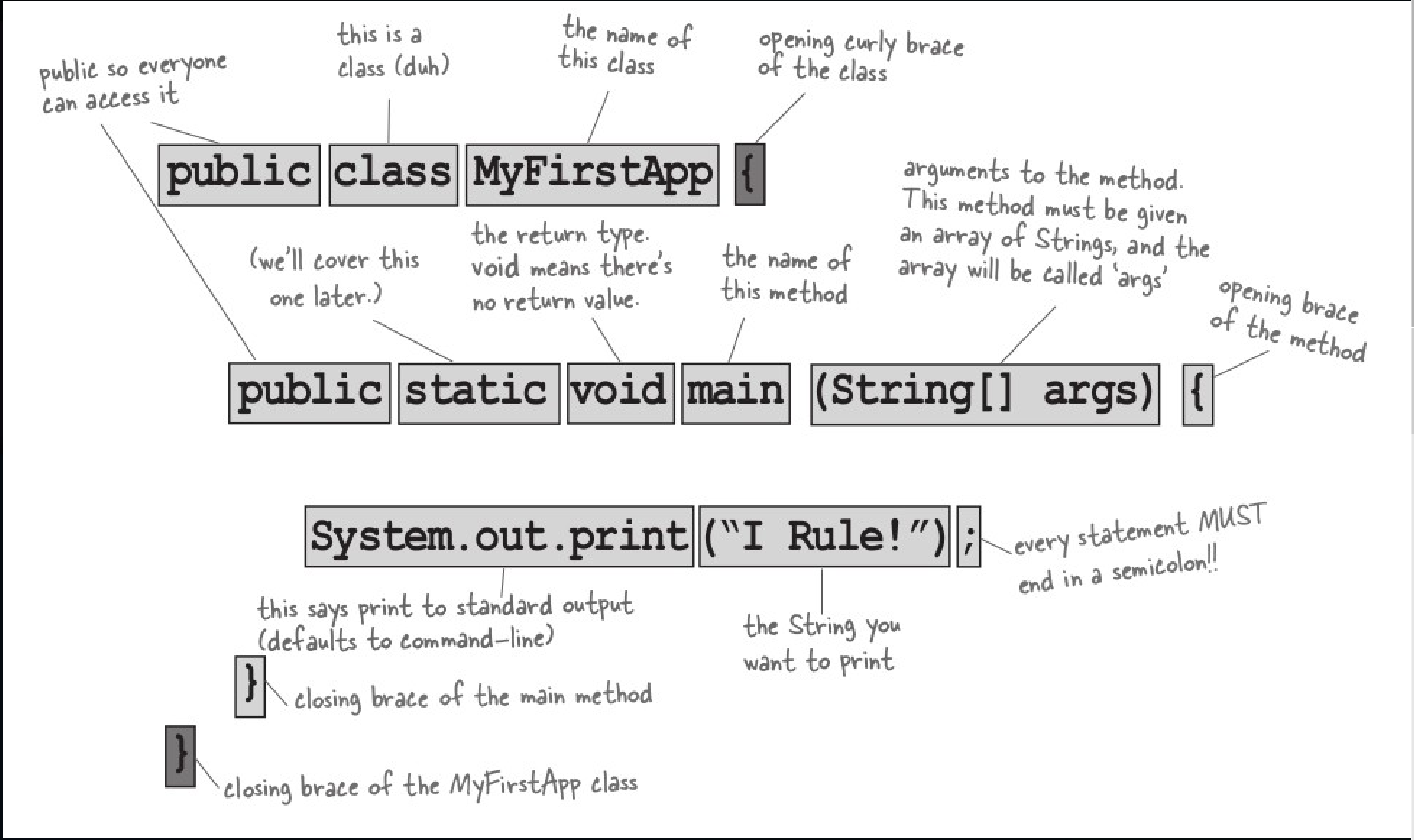
java Party

Run the program by starting the Java Virtual Machine (JVM) with the Party.class file.

Virtual Machines

4

Anatomy of a class



public so everyone can access it
this is a class (duh)
the name of this class
opening curly brace of the class
public class MyFirstApp {
(we'll cover this one later.)
the return type. void means there's no return value.
the name of this method
arguments to the method. This method must be given an array of Strings, and the array will be called 'args'
opening brace of the method
public static void main (String[] args) {
System.out.print("I Rule!");
every statement MUST end in a semicolon!!
this says print to standard output (defaults to command-line)
the String you want to print
}
closing brace of the main method
}
closing brace of the MyFirstApp class

When the JVM starts running, it looks for the class you give it at the command line

starts looking for main

Next, the JVM runs everything between the curly braces { } of your main

Writing a Simple Program

```
public class ComputeArea {

public static void main(String[] args) {

double radius; // Declare radius
double area; // Declare area

// Assign a radius
radius = 20; // radius is now 20

// Compute area
area = radius * radius * 3.14159;
// Display results
System.out.println("The area for the circle of radius " +
radius + " is " + area);
}
}
```

1- Save as ComputeArea.java
2- Complie by:
Javac ComputeArea.java
3- Run by:
java ComputeArea

Reading Input from the Console

use the Scanner class to create an object to read input from System.in

Scanner input = new Scanner(System.in);

double radius = input.nextDouble();

```
import java.util.Scanner;
public class ComputeAreaWithConsoleInput {
public static void main(String[] args) {
// Create a Scanner object
Scanner input = new Scanner(System.in); create a
Scanner
// Prompt the user to enter a radius
System.out.print("Enter a number for radius: ");
double radius = input.nextDouble();
// Compute area
```

Named Constants

- The value of a variable may change during the execution of a program, but a named constant, or simply constant, represents permanent data that never changes
- Syntax:

  final datatype CONSTANTNAME = value;
- Ex: final double PI = 3.14159; // Declare a constant

Numeric Types

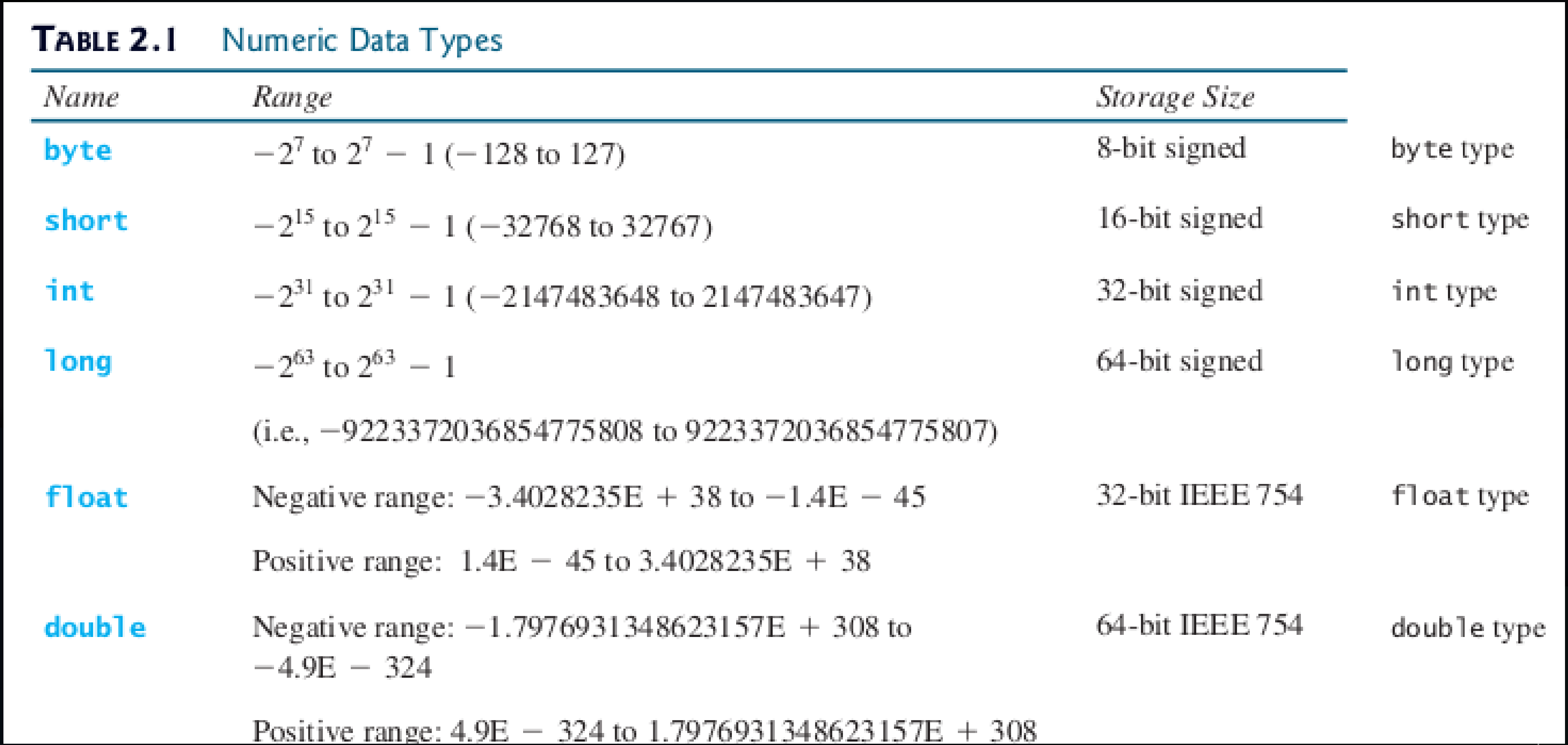
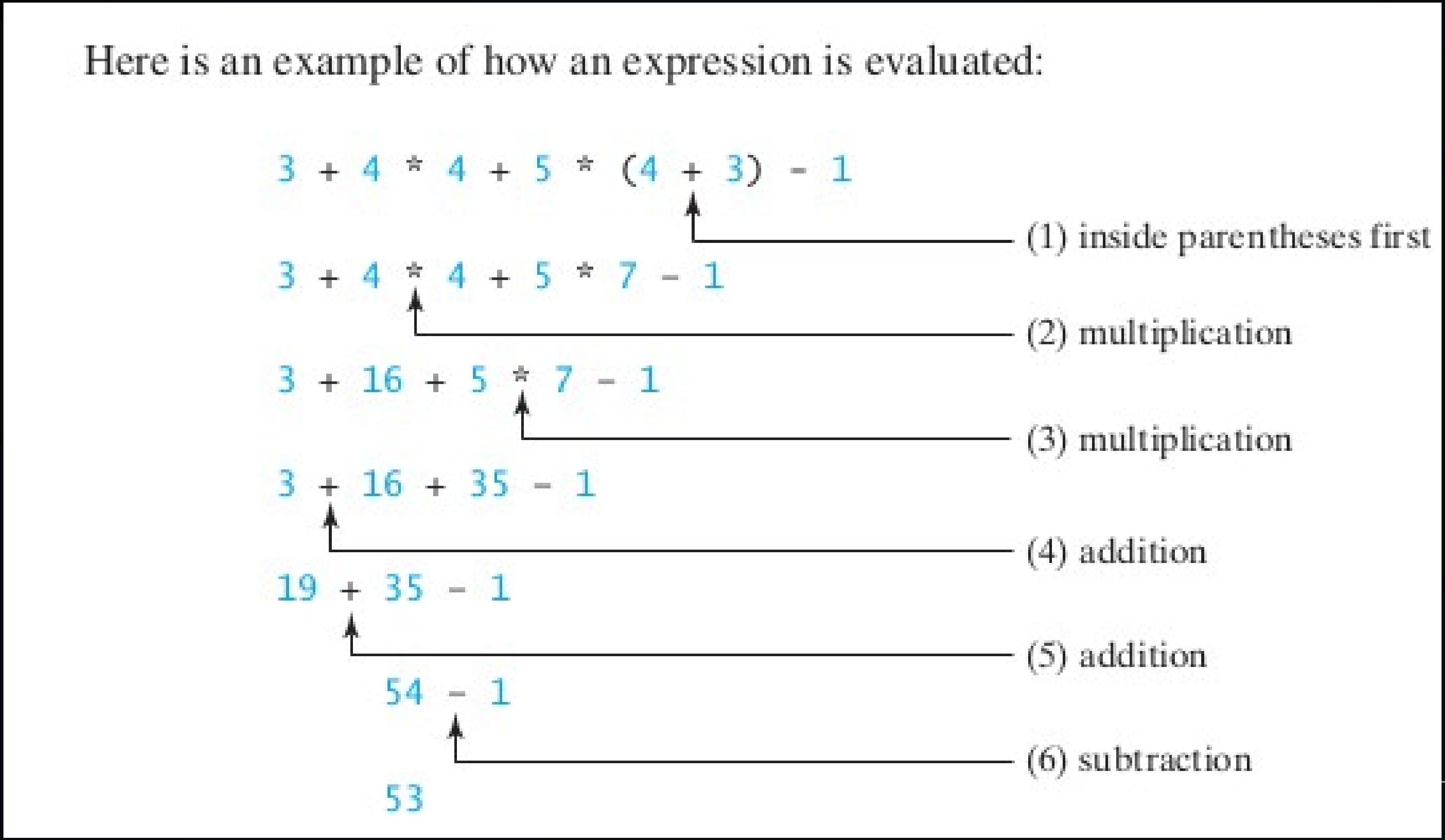


TABLE 2.1 Numeric Data Types

Name	*Range*	*Storage Size*	
`byte`	-2^7 to $2^7 - 1$ (−128 to 127)	8-bit signed	`byte` type
`short`	-2^{15} to $2^{15} - 1$ (−32768 to 32767)	16-bit signed	`short` type
`int`	-2^{31} to $2^{31} - 1$ (−2147483648 to 2147483647)	32-bit signed	`int` type
`long`	-2^{63} to $2^{63} - 1$	64-bit signed	`long` type
	(i.e., −9223372036854775808 to 9223372036854775807)		
`float`	Negative range: −3.4028235E + 38 to −1.4E − 45	32-bit IEEE 754	`float` type
	Positive range: 1.4E − 45 to 3.4028235E + 38		
`double`	Negative range: −1.7976931348623157E + 308 to −4.9E − 324	64-bit IEEE 754	`double` type
	Positive range: 4.9E − 324 to 1.7976931348623157E + 308		

Operator Precedence


Here is an example of how an expression is evaluated:

```
3 + 4 * 4 + 5 * (4 + 3) - 1
3 + 4 * 4 + 5 * 7 - 1
3 + 16 + 5 * 7 - 1
3 + 16 + 35 - 1
19 + 35 - 1
    54 - 1
    53
```

Augmented Assignment Operators

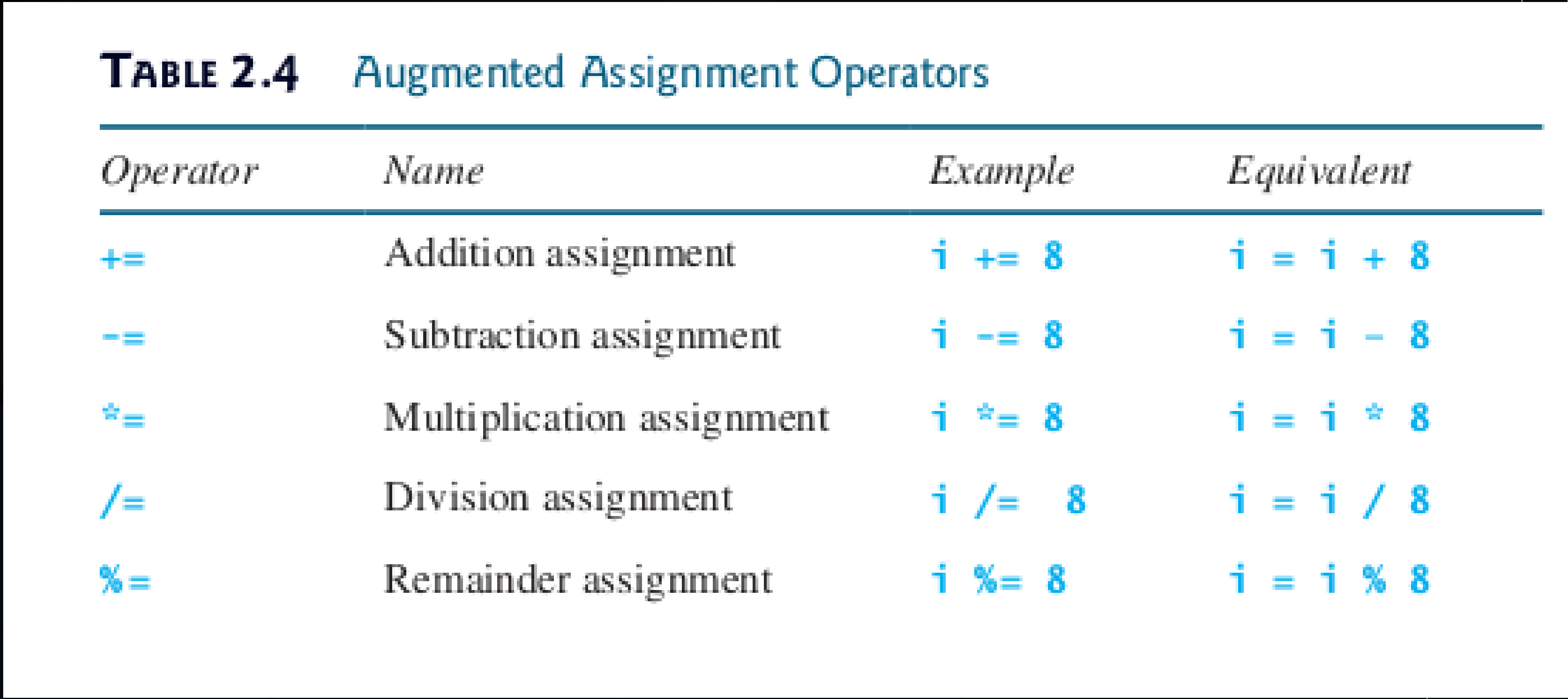


TABLE 2.4 Augmented Assignment Operators

Operator	*Name*	*Example*	*Equivalent*
`+=`	Addition assignment	`i += 8`	`i = i + 8`
`-=`	Subtraction assignment	`i -= 8`	`i = i - 8`
`*=`	Multiplication assignment	`i *= 8`	`i = i * 8`
`/=`	Division assignment	`i /= 8`	`i = i / 8`
`%=`	Remainder assignment	`i %= 8`	`i = i % 8`

Numeric Type Conversions

```
int i = 1;
byte b = i; // Error because explicit casting is required
```

Fix:

```
byte b = (byte)i;
```

Division example:

```
int num = 5;
int denom = 7;
double d = num / denom;
```

the value of d is 0.0

FIX

```
double d = ((double) num) / denom;
```

Strings

- Java strings are sequences of **Unicode** characters
- String e = ""; // an empty string

  String greeting = "Hello";
- **Substrings**

  String greeting = "Hello";

  String s = greeting.substring(0, 3);
- Concatenation

  String expletive = "Expletive";

  String PG13 = "deleted";

  String message = expletive + PG13;

Logical Operators

The logical operators ! , && , || , and ^ can be used to create a compound Boolean Expression.

int age=24;

!(age > 18) is false

(age > 28) **&&** (weight <= 140) is true

(age > 34) || (weight >= 150) is false

(age > 34) ^ (weight > 140) is false , because (age > 34) and (weight > 140) are both false .

Truth table summarized:

!: true if false

&&: true if both are true

||: true if one is true

^: true if one is false and one is true

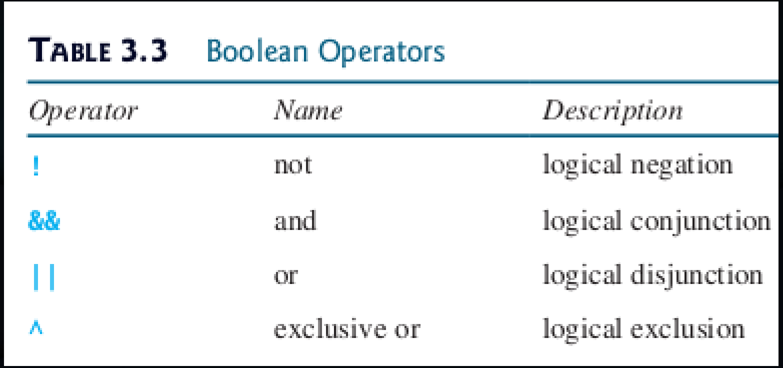


TABLE 3.3 Boolean Operators

Operator	*Name*	*Description*
!	not	logical negation
&&	and	logical conjunction
||	or	logical disjunction
^	exclusive or	logical exclusion

TestBooleanOperators.java

```
import java.util.Scanner;
public class TestBooleanOperators {
public static void main(String[] args) {
// Create a Scanner
Scanner input = new Scanner(System.in);
// Receive an input
System.out.print("Enter an integer: ");
int number = input.nextInt();
if (number % 2 == 0 && number % 3 == 0)
System.out.println(number + " is divisible by 2 and 3.");

if (number % 2 == 0 || number % 3 == 0)
System.out.println(number + " is divisible by 2 or 3.");

if (number % 2 == 0 ^ number % 3 == 0)
System.out.println(number +
" is divisible by 2 or 3, but not both."); exclusive or
}
}
```

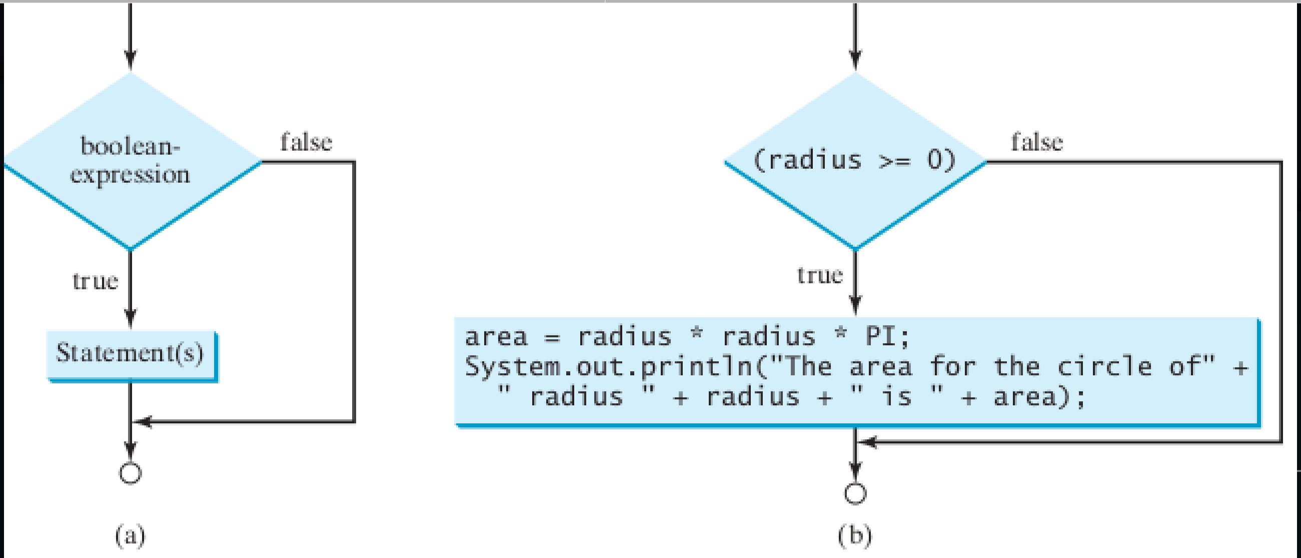
boolean Data Type

- The boolean data type declares a variable with the value either **true or false**
- **boolean isLarge=(radius < 0)** **false**
- **boolean isZero=(radius==0)** **false**
- **Boolean isNotZero=(radius!=0)** **true**

If statement

- An if statement is a construct that enables a program to specify alternative paths of execution

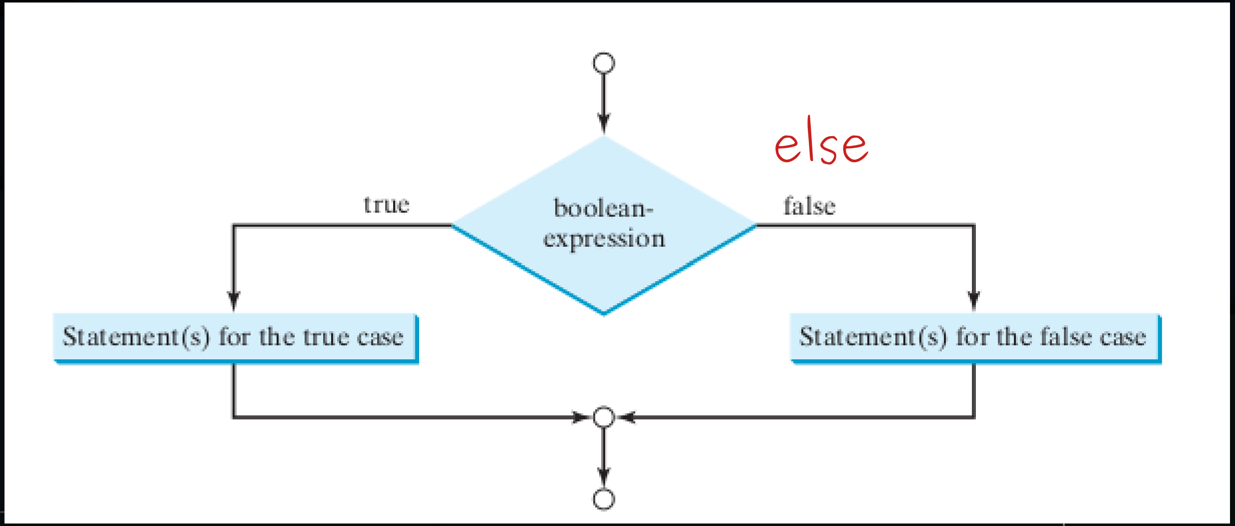
if (boolean-expression) {
statement(s);
}
	if (radius >= 0) {
	area = radius * radius * PI;
	System.out.println("The area for the circle of radius " +
	radius + " is " + area);
	}



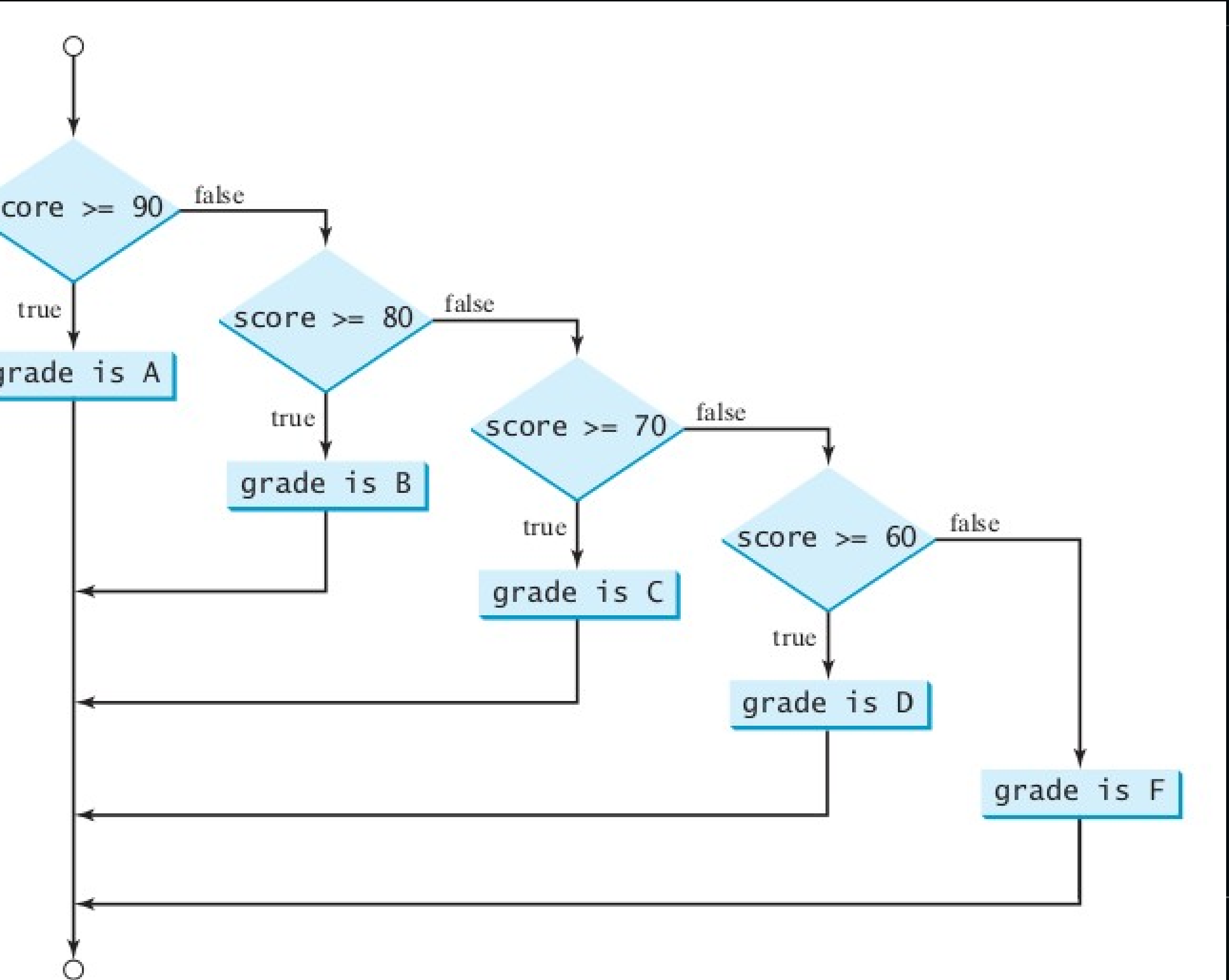
```
area = radius * radius * PI;
System.out.println("The area for the circle of" +
  " radius " + radius + " is " + area);
```

if-else Statements

```
if (radius >= 0) {
area = radius * radius * PI;
System.out.println("The area for the circle of radius " +
radius + " is " + area);
}
else {
System.out.println("Negative input");
}
```


else
true
boolean-expression
false
Statement(s) for the true case
Statement(s) for the false case

If inside If



```
if (score >= 90.0)
        System.out.print("A");
else
        if (score >= 80.0)
                System.out.print("B");
        else
                if (score >= 70.0)
                        System.out.print("C");
                else
                        if (score >= 60.0)
                                System.out.print("D");
                        else
                                System.out.print("F");
```

Generating Random Numbers

You can use **Math.random()** to obtain a random double value between 0.0 and 1.0 , Excluding 1.0

Generating a random number between zero and 10:

```
        int randInt1=Math.random()*10;
```

Generating a random integer number in a range:

```
    (int)(Math.random() * ((max - min) + 1)) + min
```

Ex between 6 and 15:

```
        (int)(Math.random() * ((9) + 1)) + 6
```

switch Statements

```
int tax=3;
switch (tax) {
   case 0: compute tax for single filers;
   break;
   case 1: compute tax for married jointly or qualifying widow(er);
   break;
   case 2: compute tax for married filing separately;
   break;
   case 3: compute tax for head of household;
   break;
   default: System.out.println("The default action");
}
```

3.14 Conditional Expressions

- Short if statement=replace if
- Ex: x=1; **y =** (x > 0) **?** **10** **:** -1;

value of y is 10