Preparation for Second Session

Opgave 4.2.1

Evaluate the following method calls:

(a) `Math.sqrt(4)`
(b) `Math.sin(2 * Math.PI)`
(c) `Math.cos(2 * Math.PI)`
(d) `Math.pow(2, 2)`
(e) `Math.log(Math.E)`
(f) `Math.exp(1)`
(g) `Math.max(2, Math.min(3, 4))`
(h) `Math.rint(-2.5)`
(i) `Math.ceil(-2.5)`
(j) `Math.floor(-2.5)`
(k) `Math.round(-2.5f)`
(l) `Math.round(-2.5)`
(m) `Math.rint(2.5)`
(n) `Math.ceil(2.5)`
(o) `Math.floor(2.5)`
(p) `Math.round(2.5f)`
(q) `Math.round(2.5)`
(r) `Math.round(Math.abs(-2.5))`

Besvarelse

```
C:\Users\vivek\.jdks\openjdk-18.0.2.1\bin\java.exe
Opgave 4.2.1a 2.0
Opgave 4.2.1b -2.4492935982947064E-16
Opgave 4.2.1c 1.0
Opgave 4.2.1d 4.0
Opgave 4.2.1e 1.0
Opgave 4.2.1f 2.718281828459045
Opgave 4.2.1g 3
Opgave 4.2.1h -2.0
Opgave 4.2.1i -2.0
Opgave 4.2.1j -3.0
Opgave 4.2.1k -2
Opgave 4.2.1l -2
Opgave 4.2.1m 2.0
Opgave 4.2.1n 3.0
Opgave 4.2.1o 2.0
Opgave 4.2.1p 3
Opgave 4.2.1q 3
Opgave 4.2.1r 3

Process finished with exit code 0
```

Opgave 4.2.2

True or false? The argument for trigonometric methods is an angle in radians.

Besvarelse

True, because we can clearly see that it has been mentioned in the text that the trigonometric angles will be converted into radians. You can look for more specification in the paragraph under 4.2.1.

Opgave 4.2.3

Write a statement that converts 47 degrees to radians and assigns the result to a variable.

Besvarelse

```
double variable = Math.cos(45);
System.out.println("Opgave 4.2.3 " + variable);
```

```
Opgave 4.2.3 0.5253219888177297
```

- We can see from the output in the console that our answer becomes 0,52.

Opgave 4.2.4

Write a statement that converts PI / 7 to an angle in degrees and assigns the result to a variable.

Besvarelse

```
double variable1 = (Math.PI)/7;
System.out.println("Opgave 4.2.4 " + Math.toDegrees(variable1));
```

```
Opgave 4.2.4 25.714285714285715
```

- Our result become 25,71 degrees.

Opgave 4.2.5

Write an expression that obtains a random integer between 34 and 55. Write an expression that obtains a random integer between 0 and 999. Write an expression that obtains a random number between 5.5, and 55.5.

Besvarelse

```java
package org.example;

import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner firstinput = new Scanner(System.in);
        int firstheltal;
        System.out.println("indsæt venligst tal for integer ");
        firstheltal = Integer.parseInt(firstinput.next());
        System.out.println(34 + (firstheltal)*(Math.random() * (55-34)));;

        Scanner secondinput = new Scanner(System.in);
        int secondheltal;
        System.out.println("Indsæt venligst tal for Integer ");
        secondheltal = Integer.parseInt(secondinput.next());
        System.out.println(secondheltal*Math.random()*1000);

        System.out.println("Den tredje er ikke helt rigtig");
        System.out.println(5.5+ Math.random()*(55.5-5.5));
    }
}
```

The following output is here.

```
C:\Users\vivek\.jdks\openjdk-18.0.2.1\bin\java.exe
indsæt venligst tal for integer
35
87.28220333908223
Indsæt venligst tal for Integer
985
499105.7072722117
30.068680355237582

Process finished with exit code 0
```

Opgave 4.2.6

Why does the Math class does not need to be imported

Besvarelse

The reason behind, that the Math.class isnt imported is because the Math.class is already in the java.lang.package. Which means, that any class in the java.lang.package is automatically imported and does not need to be written.

Opgave 4.2.7

What is Math.log(Math.exp(5.5))? What is Math.exp(Math.log(5.5))? What is Math.asin(Math.sin(Math.PI / 6))? What is Math.sin(Math.asin(Math.PI / 6))?

Besvarelse

Formula	Definition	Result
`Math.log(Math.exp(5.5))?`	In this case we are multiplying 5.5 with itself 5.5 times.	`5.5`
`Math.exp(Math.log(5.5))?`	We are using the logarithm function.	`5.5`
`Math.asin(Math.sin(Math.PI / 6))?`	We are converting to sinus, by using the radian numbers.	`0.49999999999999994`
`Math.sin(Math.asin(Math.PI / 6))?`	We are converting to degrees by using the radian numbers.	`0.5510695830994463`

```java
package org.example;

import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        System.out.println(Math.log(Math.exp(5.5)));
        System.out.println(Math.exp(Math.log(5.5)));
        System.out.println(Math.sin(Math.PI/6));
        System.out.println(Math.asin(Math.PI/6));
    }
}
```

Opgave 4.3.1

Which of the following are correct literals for characters?

‘1’, ‘\u345dE’, ‘\u3fFa’, ‘\b’, ’\t‘

Besvarelse

We can remember from the chapter, that the second literal in the line ‘\u345dE’ is not the correct literal for the character. The reason is very clear, and that is we need to have 4 hexadecimal numbers in the line and not five. This means, that the numbers after \u must be 4 digits.

Opgave 4.3.2

How do you display the characters \ and “?

Besvarelse

If you want to display characters such as backslash and quotations mark. Then you just need to apply one single character mark on both ends of the character. Look at my example.

'\' and ' " '.

Opgave 4.3.3

Use print statements to find out the ASCII code for '1', 'A', 'B', 'a', and 'b'. Use print statements to find out the character for the decimal codes 40, 59, 79, 85, and 90. Use print statements to find out the character for the hexadecimal code 40, 5A, 71, 72, and 7A.

Besvarelse

In this case I have created the following table, to showcase how I have solved this Question in the console.

Formula	Answer
The first part	
`System.out.println((int)'1');`	`49`
`System.out.println((int)'A');`	`65`
`System.out.println((int)'B');`	`66`
`System.out.println((int)'a');`	`97`
`System.out.println((int)'b');`	`98`
The second part	
`System.out.println((double)40);`	`40.0`
`System.out.println((double)59);`	`59.0`
`System.out.println((double)79);`	`79.0`
`System.out.println((double)85);`	`85.0`
`System.out.println((double)90);`	`90.0`
The third part	
`System.out.println((char)0x40);`	`@`
`System.out.println((char)0x5A);`	`Z`
`System.out.println((char)0x71);`	`q`
`System.out.println((char)0x72);`	`r`
`System.out.println((char)0x7A);`	`z`

Opgave 4.3.4

Evaluate the following:

```
int i = '1';
int j = '1' + '2' * ('4' - '3') + 'b' / 'a';
int k = 'a';
char c = 90;
```

Besvarelse

```
public class Main {
    public static void main(String[] args) {
        int i = '1';
        int j = '1'+'2'*('4'-'3')+'b'/'a';
        int k = 'a';
        char c = 90;
    }
}
```

```
C:\Users\vivek\.jdks\openjdk-18.0.2.1\bin\java.exe

Process finished with exit code 0
```

Opgave 4.3.5

Can the following conversions involving casting be allowed? If so, find the converted result.

Besvarelse

```
char c = 'A';
i = (int)c; // i becomes 65

float f = 1000.34f;
int i = (int)f; // i becomes 1000

double d = 1000.34;
int i = (int)d; // i becomes 1000

int i = 97;
char c = (char)i; // c becomes 'a'
```

Opgave 4.3.6

Show the output of the following program:

```
public class Test {
  public static void main(String[] args) {
    char x = 'a';
    char y = 'c';
    System.out.println(++x);
    System.out.println(y++);
    System.out.println(x - y);
  }
}
```

Besvarelse

In this case we have the following statement.

```
C:\Users
b
c
-2
```

Opgave 4.3.7

Write the code that generates a random lowercase letter.

Besvarelse

```
(int)(Math.random() * 26 + 'a')
```

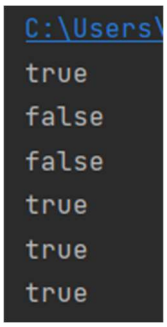
Opgave 4.3.8

Show the output of the following statements:

```
public class Main {
    public static void main(String[] args) {
        System.out.println('a'<'b');
        System.out.println('a'<='A');
        System.out.println('a'>'b');
        System.out.println('a'>='A');
        System.out.println('a'=='a');
        System.out.println('a'!='b');
    }
}
```

Besvarelse

In this case we have got the following output from the program-console.



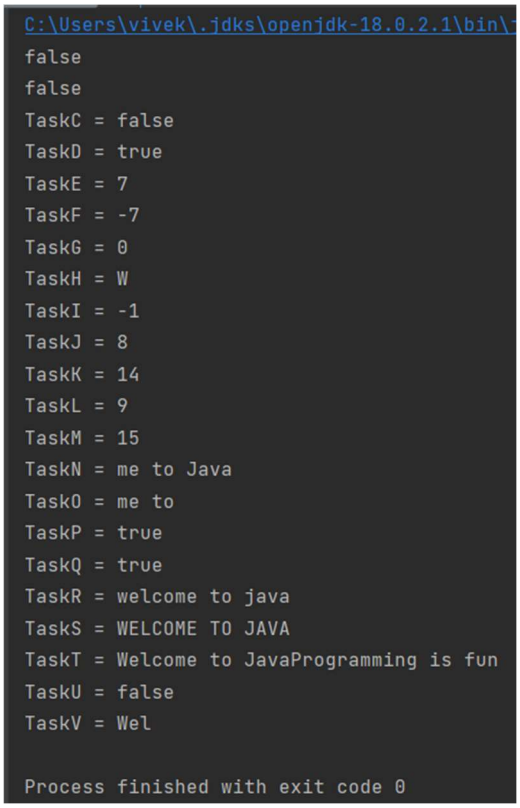
Opgave 4.4.1

Suppose s1, s2, and s3 are three strings, given as follows:

```
public class Main {
    public static void main(String[] args) {
        String s1 = "Welcome to Java";
        String s2 = "Programming is fun";
        String s3 = "Welcome to Java";

        System.out.println("TaskA = " + s1==s2);
        System.out.println("TaskB = " + s2==s3);
        System.out.println("TaskC = " + s1.equals(s2));
        System.out.println("TaskD = " + s1.equals(s3));
        System.out.println("TaskE = " + s1.compareTo(s2));
        System.out.println("TaskF = " + s2.compareTo(s3));
        System.out.println("TaskG = " + s2.compareTo((s2)));
        System.out.println("TaskH = " + s1.charAt(0));
        System.out.println("TaskI = " + s1.indexOf('j'));
        System.out.println("TaskJ = " + s1.indexOf("to"));
        System.out.println("TaskK = " + s1.lastIndexOf( ch: 'a'));
        System.out.println("TaskL = " + s1.lastIndexOf( str: "o", fromIndex: 15));
        System.out.println("TaskM = " + s1.length());
        System.out.println("TaskN = " + s1.substring( beginIndex: 5));
        System.out.println("TaskO = " + s1.substring(5,11));
        System.out.println("TaskP = " + s1.startsWith("Wel"));
        System.out.println("TaskQ = " + s1.endsWith("Java"));
        System.out.println("TaskR = " + s1.toLowerCase());
        System.out.println("TaskS = " + s1.toUpperCase());
        System.out.println("TaskT = " + s1.concat(s2));
        System.out.println("TaskU = " + s1.contains(s2));
        System.out.println("TaskV = " + "\t Wel \t".trim());
    }
}
```

Besvarelse



Opgave 4.4.2

Suppose s1 and s2 are two strings. Which of the following statements or expressions are incorrect?

```
String s = "Welcome to Java";
String s3 = s1 + s2;
s3 = s1 - s2;
s1 == s2;
s1 >= s2;
s1.compareTo(s2);
int i = s1.length();
char c = s1(0);
char c = s1.charAt(s1.length());
```

Besvarelse

In this case we can see the following markings, which I have made to tell what is right, and what is false.

```java
public class Main {
    public static void main(String[] args) {
        String s1 = "Welcome to Java";
        String s2 = "Programming is fun";
        String s3 = "Welcome to Java";
        String s4 = s1+s2;

        System.out.println(s4);
        System.out.println(s1-s2);
        System.out.println(s1==s2);
        System.out.println(s1>=s2);
        System.out.println(s1.compareTo(s2));
        int i = s1.length();
        System.out.println(i);
        char c = s1(0);
        System.out.println(c);
        char c = s1.charAt(s1.length());
        System.out.println(c);

    }
}
```

Opgave 4.4.3

Show the output of the following statements (write a program to verify your results):

```java
public class Main {
    public static void main(String[] args) {
        System.out.println("1" + 1);
        System.out.println('1' + 1);
        System.out.println("1" + 1 + 1);
        System.out.println("1" + (1+1));
        System.out.println('1' + 1 + 1);
    }
}
```

Besvarelse

```
C:\Users\vivek\.
11
50
111
12
51
```

Opgave 4.4.4

Evaluate the following expressions (write a program to verify your results):

```java
public class Main {
    public static void main(String[] args) {
        System.out.println(1 + "Welcome " + 1 + 1);
        System.out.println(1 + "Welcome " + (1 + 1));
        System.out.println(1 + "Welcome " + ('\u0001' + 1));
        System.out.println(1 + "Welcome " + 'a' + 1);
    }
}
```

Besvarelse

We have got the following output.

```
C:\Users\vivek\.jdks\openjdk-18.0.2.1\bin\java.exe
1Welcome 11
1Welcome 2
1Welcome 2
1Welcome a1

Process finished with exit code 0
```

Opgave 4.4.5

Let `s1` be `" Welcome "` and `s2` be `" welcome "`. Write the code for the following statements:

(a) Check whether `s1` is equal to `s2` and assign the result to a Boolean variable `isEqual`.

(b) Check whether `s1` is equal to `s2`, ignoring case, and assign the result to a Boolean variable `isEqual`.

(c) Compare `s1` with `s2` and assign the result to an `int` variable `x`.

(d) Compare `s1` with `s2`, ignoring case, and assign the result to an `int` variable `x`.

(e) Check whether `s1` has the prefix `AAA` and assign the result to a Boolean variable `b`.

(f) Check whether `s1` has the suffix `AAA` and assign the result to a Boolean variable `b`.

Besvarelse

```java
package org.example;

import javax.xml.transform.sax.SAXSource;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        String s1 = " Welcome ";
        String s2 = " welcome ";

        boolean isEqual = s1.equals(s2);
        System.out.println(isEqual);

        boolean isEquality = s1.equalsIgnoreCase(s2);
        System.out.println(isEquality);

        int x = s1.compareTo(s2);
        System.out.println(x);

        int x1 = s1.compareToIgnoreCase(s2);
        System.out.println(x1);

        boolean b = s1.startsWith("AAA");
        System.out.println(b);

        boolean b1 = s1.endsWith("AAA");
        System.out.println(b1);

        int x1 = s1.length();
        System.out.println(x1);
```

```
        char x2 = s1.charAt(0);
        System.out.println(x2);

        String s3 = s1 + s2;
        System.out.println(s3);

        String s3v = s1.substring( beginIndex: 1);
        System.out.println(s3v);

        String s3w = s1.substring(1,5);
        System.out.println(s3w);

        String s3x = s1.toLowerCase();
        System.out.println(s3x);

        String s3y = s1.trim();
        System.out.println(s3y);

        int y1 = s1.indexOf('e');
        System.out.println(y1);

        int y2 = s1.lastIndexOf( str: "abc");
        System.out.println(y2);
    }
}
```

Opgave 4.4.6

Write one statement to return the number of digits in an integer i.

Besvarelse

(i + “”).length();

Opgave 4.4.7

Write one statement to return the number of digits in a double value d.

Besvarelse

(d+ “”).length();