

## Java Programming Concepts

## CSC 201

## Exercises Sheet 1

## Exercise 1

- 1) What is the value of the following expression:

 $(2 - 6) / 2 + 9$ 

<input type="checkbox"/>	7
<input type="checkbox"/>	8
<input type="checkbox"/>	9
<input type="checkbox"/>	10

- 2) Evaluate (to true or false) each of the following expressions:

$1 + 2 == 3$	$25 < 5 * 5$	$8 + 1 >= 3 * 3$
--------------	--------------	------------------

<input type="checkbox"/>	true	true	true
<input type="checkbox"/>	true	true	false
<input type="checkbox"/>	true	false	true
<input type="checkbox"/>	false	true	true

- 3) What is the value of winner after the following lines have been executed?

```
boolean winner, highestPoints, disqualified;
winner = (highestPoints && !disqualified)+1;
```

<input type="checkbox"/>	true
<input type="checkbox"/>	Nothing as the code will produce an error when compiled.
<input type="checkbox"/>	false.
<input type="checkbox"/>	1

- 4) Given the variables below, evaluate the following expressions. Distinguish floating-point numbers from integers.

```
int a = 5, b = 9;
double c = 15.0;
```

1.  $a * b \% 3$ **Solution:**

This is the modulus operator. It gives the remainder when the first number is divided by the second. The remainder when 45 is divided by 3 is 0.

2.  $b/a*c-b\%a$

**Solution:**

Due to operator precedence, the first thing we evaluate is the unary minus in front of time.  $-time = -11.0$ . Then we evaluate minute/hour. These are both integers, so we do integer division, which means dropping the fraction.  $35/3$ , therefore, is 11. Then we evaluate  $11 + -11.0$ . The 11 gets automatically converted into a floating-point number, so we get  $11.0 + -11.0 = 0.0$ . Note that this is a floating-point result, and is different from 0.

3.  $(b \geq a \parallel c == 0) \&\& a*b < 40$

**Solution:**

It simply reduces to  $(false \parallel false) \&\& true$ , which reduces to  $false \&\& true$ , which is false.

## Exercise 2

1) What does the following code fragment write to the monitor?

```
int temp = 27;
if ( temp <= 24 )
{
    System.out.print("Nice weather: ");
    System.out.print("Open areas are recommended. ");
}
else
{
    System.out.print("Hot weather: ");
    System.out.print("Stay away from the sun. ");
}

System.out.println("Have a nice day");
```

**Solution:**

Hot weather: Stay away from the sun. Have a nice day

2) What will be the output of the following program?

```
int a = 5;
int b = 4;
if (b > a)
    System.out.println ("1");
else {
    if (a+2 == b)
        System.out.println ("2");
    else
        System.out.println ("3");
}
```

**Solution:**

3

## Exercise 3

1) What value is stored in the variable answer after the following line of code is executed?

```
double answer = 25%2*15+5;
```

- ☐ Nothing as the line will produce a syntax error when compiled.
- ☐ 240.0
- ☐ 20.0
- ☐ 0.0

2) If a=1, b=23, what will be the result of evaluating the following expression?

`!((1+2*a==3) && (b-23+a!=1))`

- ☐ True
- ☐ False
- ☐ None of the above

3) What is the result of evaluating the following expression?

`(3+4*5-4*5+3)`

- ☐ 0
- ☐ 12
- ☐ 6
- ☐ 3

4) Given the variables below, evaluate the following expressions. Distinguish floating-point numbers from integers.

```
int hour = 3, minute = 35;
double time = 11.0;
```

1. `minute % 3`

**Solution:**

This is the modulus operator. It gives the remainder when the first number is divided by the second. The remainder when 35 is divided by 3 is 2.

2. `minute / hour + -time`

**Solution:**

Due to operator precedence, the first thing we evaluate is the unary minus in front of time. `-time = -11.0`. Then we evaluate `minute/hour`. These are both integers, so we do integer division, which means dropping the fraction. `35/3`, therefore, is 11. Then we evaluate `11 + -11.0`. The 11 gets automatically converted into a floating-point number, so we get `11.0 + -11.0 = 0.0`. Note that this is a floating-point result, and is different from 0.

3. `(hour >= 4 || minute == 30) && minute < 40`

**Solution:**

It simply reduces to `(false || false) && true`, which reduces to `false && true`, which is false.

#### Exercise 4

1) What does the following code fragment write to the monitor?

```
int sum = 7;
if ( sum > 20 )
{
    System.out.print("You win ");
}
else
{
    System.out.print("You lose ");
}

System.out.println("the prize.");
```

**Solution:**

You lose the prize.

- 2) What will be the value of x after the execution of the following program?

```
int x = 0;
int a = 5;
int b = 5;
if (a > 0)
    if (b < 0)
        x = x + 5;
    else
        if (a > 5)
            x = x + 4;
        else
            x = x + 3;
else
    x = x + 2;
```

**Solution:**

3

- 3) What will be the output of the following program?

```
int a = 5;
int b = 7;
if (b > a)
    System.out.println ("1");
else {
    if (a+2== b)
        System.out.println ("2");
    else
        System.out.println ("3");
}
```

- |                          |                                       |
|--------------------------|---------------------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> 1 |
| <input type="checkbox"/> | 2                                     |
| <input type="checkbox"/> | 3                                     |
| <input type="checkbox"/> | both 2 and 3                          |
| <input type="checkbox"/> | None of the above                     |

**Exercise 5**

- 1) If a=3, b=7, c=3, what will be the value of the following expression:

$a*b\%c+1$

- |                          |                                       |
|--------------------------|---------------------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> 1 |
| <input type="checkbox"/> | 4                                     |
| <input type="checkbox"/> | 5                                     |
| <input type="checkbox"/> | 10                                    |

- 2) Which is not correct in the following expressions:

- |                          |                          |
|--------------------------|--------------------------|
| <input type="checkbox"/> | $5 + 4$                  |
| <input type="checkbox"/> | $(5 * 4)/2$              |
| <input type="checkbox"/> | $(-12 + (13 + 7)/2) * 4$ |
| <input type="checkbox"/> | $-12 + (13 + 7)/2 * 4$   |



3) What is the value of x after the following lines have been executed?

```
boolean y, x;
int i=1, j=2, k=3, m=4;

i=i+j+k;
y=(i==6);
k=m+k;
x=!((k > 5) || ((i+k)== (j+m)));
```

- ☐ true  
☐ Nothing as the code will produce an error when compiled.  
☒ false  
☐ 1

4) Given that a = 5, b = 9, c=7, evaluate the following expression.

- $a - b \% 5 + c * 2 + 1$

**Solution:**

Due to operator precedence, the first thing we evaluate is  $b \% 5$ :  $9 \% 5 = 4$ . Then we evaluate  $c * 2$ :  $7 * 2 = 14$ . Then we will have the following expression:  $5 - 4 + 14 + 1$  which evaluates to 16.

- $b + a * c - b \% a$

**Solution:**

Due to operator precedence, the first thing we evaluate is  $a * c$ :  $5 * 7 = 35$ . Then we evaluate  $b \% a$ :  $9 \% 5 = 4$ . Then we will have the following expression:  $9 + 35 - 4$  which evaluates to 40.

- $(a == b || c == 0) \&\& ((a+b) > c)$

**Solution:**

It reduces to  $(false || false) \&\& true$ , which reduces to  $false \&\& true$ , which is false.

## Exercise 6

1) What does the following code fragment write to the monitor?

```
int iq = 150;
if ( (iq >= 100) && (iq < 140) )
    System.out.println("You are an average person");
else
{
    if ( (iq >= 140) && (iq < 170) )
        System.out.println("You are smart ");
    else
        System.out.println("You are a genius!! ")
}
```

**Solution:**

- ☐ You are an average person  
☒ You are smart  
☐ You are a genius!!  
☐ None of the above

2) What will be the output of the following program?

```
int a = 10;
int b = 14;
if (b > a)
```

```

{
    int c = b - a;
    System.out.println ("The difference is: " + c);
}
else
    System.out.println ("The values are: " + a + b);

```

**Solution:**

The difference is: 4

## Exercise 7

1) Write a Java declaration for the following:

- An integer named x initialized to -1

**Solution:**

```
int x = -1;
```

- An uninitialized string intended to hold someone's name.

**Solution:**

```
String name;
```

- Three variables initialized to 10.5, 0, 11.5 respectively.

**Solution:**

```
double x=10.5;
int y = 0;
double z = 11.5;
```

2) What is the value of the following expression:

```
boolean x=true, y=false, z;
z = !((!x && !y) || y);
```

☐  
☐  
☐  
☐

true

Nothing as the code will produce an error when compiled.

false

1

3) Given the variables below, evaluate the following expressions. Distinguish floating-point numbers from integers.

```
int m = 18, n = 4;
double x = 2.5, y = -1.5;
String s = "Hello";
String t = "World";
```

1.  $x + n * y - (x + n) * y$

**Solution:**

6.25

2.  $m / n + m \% n$

**Solution:**

6

3.  $(5 * x - n / 5)$

**Solution:**

12.5

4.  $s + t$

**Solution:**

HelloWorld

## Exercise 8

1) What does the following code fragment write to the monitor?

```
int a = 6, b = 8;
char op = '*';
if ( op == '+' )
{
    System.out.print("The result is: ");
    System.out.print(a+b);
}
else
{
    if ( op == '-' )
    {
        System.out.print("The result is: ");
        System.out.print(a-b);
    }
    else
        System.out.print("Unknown operator. ");
}
System.out.println("Have a nice day");
```

**Solution:**

Unknown operator. Have a nice day

2) What will be the output of the following program?

```
int x = 3, y = 6, z = 10;
double w = 12.0;

if ((x + y) > z)
    System.out.println("x, y and z can form the sides of a triangle");
else
{
    z = z*2;
    w = w + z;
    System.out.println("The new values are: " + w + z);
}
```

**Solution:**

The new values are: 32.020

## Exercise 9

1) If  $a = 10, b = 5, c = 2$ , what will be the output for the following expressions:

- `System.out.println("a="+a+" b=" +b+" c=" +c);`
- `System.out.println("a= \t" +a+"b= \t " +b+" c= \t " +c);`

**Solution:**

a=10 b=5 c=2

a= 10b= 5 c= 2

2) Mark the correct answer in the following (**only one choice**):

- What is the value of the following expressions:

35/10+13%5

☐  
☐  
☒  
☐

5

Nothing as the code will produce an error when compiled.

6

3

- $1+2 > 4-2 \ \&\& \ 12 < 23$

☐  
☐  
☐

True

Nothing as the code will produce an error when compiled.

False

- $1+2 > 4-2 \ || \ 12 < 23$

☐  
☐  
☐

True

Nothing as the code will produce an error when compiled.

False

- $2 < 4 \ \&\& \ (\text{false} \ || \ 5 \leq 4)$

☐  
☐  
☐

True

Nothing as the code will produce an error when compiled.

False

**Exercise 10**

1) What does the following code fragment write to the monitor?

```
int X = 0;
if (X < 4) {
    if (X > 1)
        X = 3;
    else
        X = 1;
}
else
    X = 4;
System.out.println("The final value is " + X);
```

**Solution:**

The final value is 1

2) What will be the output of the following program?

```
int rate = 5;
double balance = 1000.0;

if (balance > 0) {
    balance = balance + rate*balance/12;
    System.out.println("The new balance is " + balance);
}
else
    System.out.println("Invalid balance");
```



**Solution:**

The new balance is 1416.6666666666667

**Exercise 11**

1) What will be the output for the following expressions:

- $10\%3+(3+8/2);$

**Solution:**

8

- $(3 \geq 3) \ \&\& \ !(10 == 20)$

**Solution:**

true

2) Mark the correct answer in the following (only one choice):

- What is not correct in the following code:

```
int X = 4;
int Y = 6;
if (X = 0) {
    X = X + 12;
    Y = Y + 1; }
else
    System.out.println("Invalid data");
```

- ☐ The expression  $(X = 0)$  is not correct
- ☐ Nothing, the code is correct
- ☐ The curly braces should not be used
- ☐ We should use print instead of println

- What is not correct in the following code:

```
boolean a = true, b = false;

if (a && b)
    System.out.print("true");
else
{
    a = a+1;
    System.out.print("false");
}
```

- ☐ The expression  $(a \ \&\& \ b)$  is not correct
- ☐ The print statement is not correct.
- ☐ The expression  $a = a+1$  is not correct
- ☐ Nothing, the code is correct

- What is the value of the following expression:

$-10+12+6/4*3$

- ☐ 2
- ☐ 4
- ☒ 5
- ☐ 8

- What is the value of the following expression:

$\text{false} \ || \ \text{true} \ \&\& \ \text{false} \ || \ \text{true} \ \&\& \ \text{false}$

- ☐ True  
☐ Nothing as the code will produce an error when compiled.  
☒ False

### Exercise 12

- 1) What does the following code fragment write to the monitor?

```
int num = 7;
int X = 0;

if (num%3 > 1)
    X = X + 2;
else {
    if (num%3 > 0)
        X = X + 3;
    else
        X = X + 4;
}
System.out.println ("num= " +num+" X= " +X);
```

**Solution:**

num= 7 X= 3

- 2) What will be the output of the following program?

```
int a = 5;

if (a >= 10)
    System.out.print("Over");
else
    System.out.print("Under");
System.out.println("the limit");
```

**Solution:**

Underthe limit

### Exercise 13

- 1) What will be the output for the following expressions:

- $11.0/2*3-8\%3$ ;

**Solution:**

14.5

- $!(6 \geq 2) \ || \ !(10 \neq 20)$

**Solution:**

false

- 2) What does the following code output:

```
int X = 4, Y = 10;
System.out.println("The result is: " + X/Y);
```

- ☐ The result is: 0.4
- ☒ The result is: 0
- ☐ The result is: 1
- ☐ The result is: 4/10

3) What is the output of the following code:

```
int num = 412;
System.out.println(num/100);
System.out.println(num/10%10);
System.out.println(num%10);
```

**Solution:**

```
4
1
2
```

#### Exercise 14

1) What does the following code fragment write to the monitor?

```
int i = 7;
double sum = 0.0;

if (i%2 != 0) {
    sum = sum + i%2;
    System.out.print("The sum is: " +sum);
}
else {
    sum = sum + i;
    System.out.print("The sum is: " +sum);
}
System.out.println (" for i= "+i);
```

**Solution:**

```
The sum is: 1.0 for i= 7
```

2) What will be the output of the following program?

```
int a = 5, b = 7, c = 9;

if (a > b) {
    if (a > c)
        System.out.println("Max is: " +a);
    else
        System.out.println("Max is: " +c);
}
else {
    if (b > c)
        System.out.println("Max is: " +b);
    else
        System.out.println("Max is: " +c);
}
```

**Solution:**

Max is: 9

**Exercise 15**

What will be the output of the following program?

```
public class Quiz
{
    public static void main(String[] args)
    {
        System.out.println((1 + 2 + 3 + 4 + 5) / 5);

        System.out.println((1 + 2 + 3 + 4 + 5) / 2.0);

        System.out.println((1 + 3 + 4 + 5) / 4.0);

        int nSlices = 14;
        int nPeople = 4;

        int nPerPerson = nSlices / nPeople;

        int nLeftover = nSlices % nPeople;

        System.out.println("Each person gets " + nPerPerson + " slices.");

        System.out.println("There are " + nLeftover + " left over.");

        if (nPeople > nSlices)
        {
            System.out.println("Error: not enough pizza!");
        }
    }
}
```

**Solution:**

```
3
7.5
3.25
Each person gets 3 slices.
There are 2 left over.
```

**Exercise 16**

What will be the output of the following programs?

```
1) public class Conditional
{
    public static void main(String[] args)
    {
```



```

boolean myBoolean = true;

if (myBoolean)
{
    System.out.println("Yes, it's true!");
}

if (myBoolean)
{
    System.out.println("It's still true!");
}
else
{
    System.out.println("No, it's false!");
}

}
}

```

**Solution:**

```

Yes, it's true!
It's still true!

```

```

2) public class test {
    public static void main(String[] argv) {
        int a = 20;
        int b = 14;
        if ((b < a) && !(b == 3*a))
        {
            int c = b - a;
            System.out.println("The result is: " + c);
        }
        else
            System.out.println ("The values are: " + a + b);
        System.out.println ("End of program");

    }
}

```

**Solution:**

```

The result is: -6
End of program

```

### Exercise 17

What will be the output of the following program?

```

public class Quiz2

{
    public static void main(String[] args)
    {
        System.out.println(7.0 / 3.0);
        System.out.println(7.0/3);
    }
}

```

```

System.out.println(7/3);

System.out.println(6-2+4);

System.out.println(6-(2+4));

System.out.println(6*2%3-5);

System.out.println((3 * 12) >= (30 - 5 * 3));

System.out.println((2==4) || (2<4));

System.out.println(!(2==4) && (2<4));

System.out.println(!(2==4) || (2<4) && (4*3 == 12)));

System.out.println(4 + "You");

System.out.println('c' + "\t" + "You");

} }

```

**Solution:**

```

2.3333333333333335
2.3333333333333335
2
8
0
-5
true
true
true
false

```

4You  
c        You

### Exercise 18

What will be the output of the following programs?

```
1) public class Guess
{
    public static void main(String[] args)
    {
        int MIN = 1, MAX = 5;
        int answer = (MIN + MAX)/2;
        int guess = 4;

        if (guess == answer)
        {
            System.out.println("Correct - well done!");
        }
        else
        {
            System.out.println("No, the answer was " + answer + ".\n");
        }
    }
}
```

**Solution:**

No, the answer was 3

```
2) int x = 8;
   if ( x > 5)
       if ( x > 10 )
           System.out.println("x > 10");
   else
       System.out.print ("x <= 5");
```

**Solution:**

x <= 5









