Exercise 1

1) Show the result of the following code:
   a) System.out.println(**2** * (**5** / **2** + **5** / **2**));
   b) System.out.println(**2** * **5** / **2** + **2** * **5** / **2**);
   c) System.out.println(**2** * (**5** / **2**));
   d) System.out.println(**2** * **5** / **2**);

2) Are the following statements correct? If so, show the output.
   a) System.out.println("25 / 4 is " + 25 / 4);
   b) System.out.println("25 / 4.0 is " + 25 / 4.0);
   c) System.out.println("3 + 2 is " + 3 + 2);
   d) System.out.println("3 + 2 is " + (3 + 2));
   e) System.out.println("3 * 2 / 4 is " + 3 * 2 / 4);
   f) System.out.println("3.0 * 2 / 4 is " + 3.0 * 2 / 4);

3) Suppose **m** and **r** are integers. Write a Java expression for **mr²** to obtain a floating-point result.

4) How would you write the following arithmetic expression in Java?

   a) $\dfrac{4}{3(r+34)} - 9(a+bc) + \dfrac{3+d(2+a)}{a+bd}$

   b) $5.5 \times (r+2.5)^{2.5+t}$

5) Show the output of the following code:
```
double a = 6.5;
a += a + 1;
System.out.println(a);
a = 6;
a /= 2;
System.out.println(a);
```

6) Show the output of the following code:

```
int a = 6;
int b = a++;
System.out.println(a);
System.out.println(b);
a = 6;
b = ++a;
System.out.println(a);
System.out.println(b);
```

7) Is the following code going to print 0.1 and why?

```
System.out.println(1.0 - 0.9);
```

Exercise 2:

Choose the correct answer:

A. The value of 15 / 2 is:
  (i) 7   (ii) 7.5   (iii) 7 ½   (iv) 0.75   (v) none
B. The value of 18 / 3 is:
  (i) 6   (ii) 0.167   (iii) 6.0   (iv) none
C. The value of 22 % 7 is:
  (i) 3   (ii) 1   (iii) 3.142   (iv) 22/7
D. The value of 5 % 7 is:
  (i) 0   (ii) 2   (iii) 5   (iv) undefined
E. The value of 17.0 / 4 is:
  (i) 4   (ii) 4.25   (iii) 4.0   (iv) undefined
F. The value of 5 - 3.0 + 2 is:
  (i) 0   (ii) 0.0   (iii) 4   (iv) 4.0
G. The value of 7 - 5 * 2 + 1 is:
  (i) -2   (ii) 5   (iii) 6   (iv) none

Exercise 3

What are the values of x, y, z and w after running all statements?

```
int x=5, y, z=3, w;
y = x - z;
z = 2 * y + 3;
w = x - 2 * y + z;
z = w - x;
w++;
```

Exercise 4

Evaluate the following expressions:

    A. 3 + 4 * 6 / 8 - 2
    B. 3 + 5 * 6 / 4 - 3
    C. 3 + 5.0 * 6 / 4 - 3
    D. int x=2, y=4;
        double z=7.0, w=12.0;
            a. x * w + z - y;
            b. x > w
            c. (x>y) || (z<w)
            d. !(x>w) && (z==w)

Exercise 5

Write a program that changes a given amount of money into smaller monetary units. The program lets the user enter an amount as a **double** value representing a total in Riyals and Halals, and outputs a report listing the monetary equivalent in the maximum number of riyals, halfs (SR 0.5), quarters (SR 0.25), qirsh (SR 0.05), and halalah (SR 0.01), in this order, to result in the minimum number of coins.

Here is a sample run:

```
Enter an amount of Riyals and Halalas : 11.88 ↵
Your amount 11.88 consists of
    11 riyals
    1 halfs
    1 quarters
    2 qirshs
    3 halalahs
```

Tutorial 03 Solutions

Solution Exercise 1

Note: Unanswered questions are left as self-exercises for student.

1)
   a) 8
   b) 10

2)
   a) 25 / 4 is 6
   b) 25 / 4.0 is 6.25
   c) 3 + 2 is 32
   d) 3 + 2 is 5

3) **double** x = m * Math.*pow*(r,2);

4)
   a) **double** result = 4 / (3 * (r + 34)) - 9 * (a + b * c) + (3 + d * (2 + a)) / (a + b * d);

5)

```
14.0
3.0
```

6)

```
7
6
7
7
```

7) The output is going to be **0.09999999999999998** not **0.1** because double type is not stored with complete accuracy but instead approximated. This is called *rounding error* and it is why double can not be used for applications that need decimal point with precision such as financial applications.

Solution Exercise 2

A. (i) **B.** (i) **C.** (ii) **D.** (iii) **E.** (ii) **F.** (iv) **G.** (i)

Solution Exercise 3

x = 5
y = 2
z = 3
w = 9

Solution Exercise 4

A. 4 **B.** 7 **C.** 7.5 **D.a** 27.5 **D.b** false **D.c** true **D.d** false

Solution Exercise 5

Here are the steps in developing the program:

A. Prompt the user to enter the amount as a decimal number, such as **11.88**.

B. Convert the amount (e.g., **11.88**) into halalas (**1188**).

C. Divide the halalas by **100** to find the number of riyals. Obtain the remaining halalas using the halalas remainder **100**.

D. Divide the remaining halalas by **50** to find the number of halfs. Obtain the remaining halalas using the remaining halalas remainder **50**.

E. Divide the remaining halalas by **25** to find the number of quarters. Obtain the remaining halalas using the remaining halalas remainder **25**.

F. Divide the remaining halalas by **5** to find the number of qirshs. Obtain the remaining halalas using the remaining halalas remainder **5**.

G. The remaining halalas are the halalas (can not be divided).

H. Display the result.

```java
import java.util.Scanner;
public class ComputeChange {
 public static void main(String[] args) {
  // Create a Scanner
```

```java
        Scanner input = new Scanner(System.in);
        // Receive the amount
        System.out.print("Enter an amount of Riyals and Halalas : ");
        double amount = input.nextDouble();
        int remainingAmount = (int) (amount * 100);

        // Find the number of one riyals
        int numberOfOneRiyals = remainingAmount / 100;
        remainingAmount = remainingAmount % 100;

        // Find the number of halfs in the remaining amount
        int numberOfHalfs = remainingAmount / 50;
        remainingAmount = remainingAmount % 50;

        // Find the number of quarters in the remaining amount
        int numberOfQuarters = remainingAmount / 25;
        remainingAmount = remainingAmount % 25;

        // Find the number of qirshs in the remaining amount
        int numberOfQirshs = remainingAmount / 5;
        remainingAmount = remainingAmount % 5;

        // Find the number of halalas in the remaining amount
        int numberOfHalalas = remainingAmount;

        // Display results
        System.out.println("Your amount " + amount + " consists of");
        System.out.println("    " + numberOfOneRiyals + " riyals");
        System.out.println("    " + numberOfHalfs + " halfs ");
        System.out.println("    " + numberOfQuarters + " quarters");
        System.out.println("    " + numberOfQirshs + " qirshs");
        System.out.println("    " + numberOfHalalas + " halalas");
    }
}
```

Done...