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Introduction to Computer Programming, Spring Term 2017
Practice Assignment 2

Discussion: 18.2.17 - 23.2.17

Exercise 2-1   Java Expressions
                     To be discussed in the Tutorial

a) $-(-1)$

b) $--1$

c) $2*4(-6)$

d) $(12)*(4)-6$

e) $29\%5\%3*4-2$

f) $29\%5\%3-4*2$

g) $7\%3 = 1$

h) $1 / 0$

i) $1 / 0.0$

j) $((10 - 2) * 4\%)8)$

k)
```
int x = 2;
int y = 3;
int z = 4;
int v = x | y & z;
```

l)
```
int x   =   9;
int y   =   0;
boolean z = (x<10 |   x/y   == 0);
System.out.print ("Success! The value is " + z );

int x   =   9;
int y   =   0;
boolean z = (x<10 ||   x/y   == 0);
System.out.print ("Success! The value is " + z );
```

m)
```
float x   =   2.5;
float y   =   3.4;
float z = x + y;
System.out.print ("The value is " + z );
```

```
o)  int x = 34567456;
    long y = 1234567;
    long z = x + y;
    System.out.println("The value is " + z );
    y = 46547864784282;
    z = x + y;
    System.out.print ("The value is " + z );

p)  byte x = 12;
    byte y = 8;
    byte z = x + y;
    System.out.print ("The value is " + z );

q)  String x = "CSEN";
    int y = 202;
    String z = x + y + "!";
    System.out.println( z );
    String u = y + x + "!";
    System.out.println( u );
    String v = y;
    System.out.println( v );
    String m = "204";
    int o = m;
    System.out.println( o );
```

Exercise 2-2   Errors and Conventions
             To be discussed in the lab

In the following lab exercises, follow the instructions carefully and observe the outcome. In each case you should be able to explain why the output is as it is. You are encouraged to check out the useful links on MET Website `http://met.guc.edu.eg/Courses/Links.aspx?crsEdId=480`

For each of the .java classes in the " Lab 1 Exercises.zip " zipped folder, compile the files on JCreator. You are asked to define in each file the lines which have the following faults:

   a) Syntax Errors

   b) Runtime Errors

   c) Logic Errors

Furthermore, specifically define the errors. For example, the following line of code:

```
String Word = "Hello World!";
system.out.print(Word)
```

has two Syntax Errors and 1 bad identifier naming. The correct solution is:

```
String word = "Hello World!";
System.out.println(word);
```

Exercise 2-3   Number Precision, Exactness
             To be discussed in the Lab

Given the snippet of code below, what will be the values of d3 and d4 that will be printed?

```
double d1 = 1.03;
double d2 = 0.42;
double d3 = d1 - d2;
System.out.println(d3);

double d4 = 0.1;
float f = (float) d4;
d4 = 1 - f;
System.out.println(d4);
```

Exercise 2-4   Picking a random card
To be discussed in the lab

Given a deck of 1000 cards, you would like to pick the $n^t h$ card where n is a random number.

You should try out the following two methods:

- `Math.random()` as discussed in the lecture.

- `nextInt(int x)` where x is the upper bound of the range (exclusive). **Hint**: it is used with a `Random` type variable.

Exercise 2-5   Supermarket Change

Write a Java program CountChange to count change. Given the number of quarter, dimes, nickles, and pennies the program should output the total as a single value in dollars and pennies.

Hint:

- One dollar corresponds to 100 pennies.

- One quarter corresponds to 25 pennies.

- One dime corresponds to 10 pennies.

- One nickle corresponds to 5 pennies.

For example if we have: 3 quarters, 2 dimes, 1 nickle and 6 pennies, then the total is 1.06 dollars.

Exercise 2-6   Cook in a Hurry

You want to cook some pasta, but you are short of time. To be sure you can finish cooking before your next appointment, you need to know how long it takes for the water to boil.

At its highest setting, your stove needs two minutes per liter ($1l = \frac{1}{1,000} m^3$) to reach the boiling point. You use a cylindric pot.

Write a program that, given the diameter of the pot and the hight of the water in it, calculates the the time needed for the water to boil.

Hint. The Volume of a cilinder is $\pi \times r^2 \times h$.

Exercise 2-7   Electrical Resistance

The equivalent resistance of resistors connected in series is calculated by adding the resistances of the individual resistors.
The formula for resistors connected in parallel is a little more complex. Given two resistors with resistances R1 and R2 connected in parallel the equivalent resistance is given by the inverse of the sum of the inverses; e.g.

$\frac{1}{Req} = \frac{1}{R1} + \frac{1}{R2}$.

Write a program that given 3 resistances outputs the equivalent resistance when they are connected in series and when they are connected in parallel.

Exercise 2-8   Temperature Conversion

Assume that you have a Celsius scale temperature of 100 degrees and you wish to convert it into degrees on the Fahrenheit scale and the Kelvin scale. This conversion is done using the following formulas.

$$T_f = \frac{9}{5} \times T_c + 32, \; and$$

$$T_k = T_c + 273.$$

Where T_f is temperature in degrees Fahrenheit, T_c is temperature in degrees Celsius, and T_k is temperature in degrees Kelvin.

Write a Java program that takes as an input a degree in Celsius scale and converts it into both Fahrenheit and Kelvin scales.

Exercise 2-9   Octal Conversion

Assume that you have an octal number (base 8) and you would like to convert it into its equivalent decimal number (base 10) and binary number (base 2). For example: $(27)_8$ is equal to $(23)_{10}$ in decimal and $(10111)_2$ in binary.

Write a sequential Java program to convert a two digit octal number into its equivalent binary and decimal numbers.