Dalarna University
Introduction to Object-oriented Programming:
7,5hp
Exam. Course Module 2
Part: Programming Exercises

30 Oct. 2018

Contents

Individual Hand-in Assignment

Part I

Formalia

All code must be **commented** using your own words in the java doc notation. So, at whom am I writing comments for?

Answer: Think of it as explaning the code to a student which is one course module behind you!

1 Time available

See the Learn (Blackboard)-directory opening hours

2 Aid

This is an open book/note exam, which means that you can use any book, notes, or Internet references which can support your solutions. You are not allowed to communicate (in any form) with another human being.

Exercises must be solved individually.

Beware of plagiarism. Plagiarism can be defined as the use of words and ideas and works that belong to somebody else that one presents as one's own. Plagiarism is an academic crime that can lead to expulsion from a course or a programme. It is therefore important that you know how to cite and reference correctly. Therefore you have to read more under section 3, below.

3 Submitting Your Answers

BEWARE OF PLAGIARISM
By your act of submitting this exam **you also confirm** that you have **read and understood** the following: **https://www.du.se/en/library/academic-writing/** including the hyperlink and especially (at the bottom of the previous link target) 'Refero - Helps you understand what plagiarism is and how to avoid it.

- Hand in the Eclipse project(s) in **one** zip-file in Learn (Blackboard)
- The project must be named as: `YourUserName_YourTargetGrade_Exam_CM2_courseCode.zip`
  - The *target grade* indicates which grade you are targeting in this exam
  - Examples: `h18abcde_VG_Exam_CM2_ik1052.zip`, or `h18abcde_G_Exam_CM2_ik1052.zip`

4 Grading

For the grade it is:

Godkänd (G) To *pass* (G) this you must complete **every assignment** marked **[M]** (= Mandatory). In effect, this means that you have reached the target learnings outcomes according to the course syllabus. You must also answer all the questions in the reflection protocol (see the final task in this exam)

Väl Godkänd (VG) To *pass with distinction* (VG) you must first complete every assignment marked **[M]** and then continue on the additional **[*VG*]** exercises. This means that you have fulfilled the criteria for G, and you have also shown deeper knowledge and skills. You must also answer all the questions in the reflection protocol (see the final task in this exam)

Part II
Exercises

5 Mandatory Exercises for grade G and VG

0. **[M]** When you submit your solutions make sure that you:
   (a) Submit all files, including the **complete** Netbeans (or Eclipse) project, in **one** zip file.
   (b) For the sake of our assessment of your work: After extraction of the zip-file, the project must be ready for execution in the Netbeans (or Eclipse) environment.
   (c) name the zip-file correctly (see section 3 above)
   (d) state your real world name or the user name at Dalarna University as the author at the top in each file

1. **[M]** *Even/odd counter*. You can use the following logic to determine whether a number is even or odd:

```
if ((number % 2) == 0) {
        // The number is even.
}
else {
        // The number is odd. }
```

   Write a program with a method named `isEven` that accepts an `int` argument. This method should return `true` if the argument is even, or `false` otherwise. The program's `main` method should use a loop to generate `n` random integers. The number `n` should be read from a text file (you will fin a file named *n.txt* in Learn). The main method should then use the `isEven` method to determine whether each random number is even, or odd. When the loop is finished, the program should display the number of even numbers that were generated, and the number of odd numbers. The output should look like below:

```
200 numbers were generated
108 numbers are odd, which is 54%
92 numbers are even, which is 46%
```

2. **[M]** Fill in this reflection protocol: **Students Reflection Protocol**

3. **[*VG*]** A standard score, also called the ***z-score***, indicates how many standard deviations an element is from the mean, see figure 1. The z-score can be calculated using the following formula:

$$z = \frac{X - \mu}{\sigma} \tag{1}$$

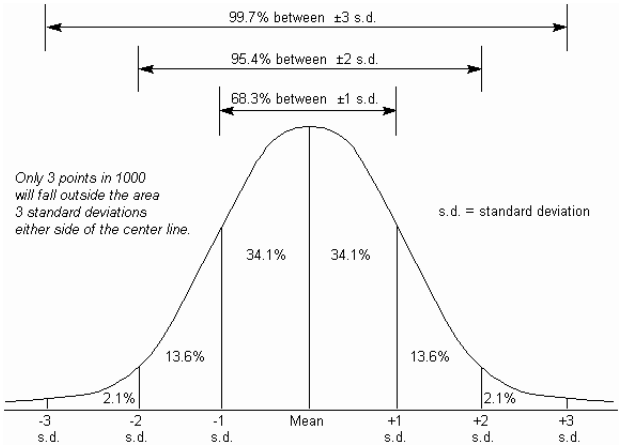

Figure 1: z-scores

where z is the z-score value, X is the value of the element, μ is the mean of the population, and σ is the standard deviation. Here is how to interpret z-scores: A z-score

- less than 0 represents an element less than the mean.
- greater than 0 represents an element greater than the mean.
- equal to 0 represents an element equal to the mean.
- equal to 1 represents an element that is 1 standard deviation greater than the mean; a z-score equal to 2, 2 standard deviations greater than the mean; etc.
- equal to -1 represents an element that is 1 standard deviation less than the mean; a z-score equal to -2, 2 standard deviations less than the mean; etc.

Test your understanding:

- An exam test has a mean score of 100 and a standard deviation of 15. If a certain student A had the z-score equaling 1.20, what was A's score on the exam test? Solution: In this case we know that $z = 1.20$, $\sigma = 15$, and $\mu = 100$. To get the exam test score X, we get:

$$X = (z * \sigma) + 100 = (1.20 * 15) + 100 = 18 + 100 = 118$$

(a) **[*VG*]** Ten persons (A to J) completed a pilot licence test. Their scores were: 166, 175, 177, 184, 190, 196, 207, 214, 222, 222, respectively. Store their original scores in a array named *oScore*, compute their z-score in a loop (choose any loop), and store their z-score (as given by equation 1) in a array of the same size called *zScore*. Print out their original score and their z-score, respectively.

(b) **[*VG*]** Their pilot instructor decided before the test that all pilot candidates having a z-score more than -1, i.e. $z > (-1)$, will pass the test and will thus be able to continue their pilot training. You must print out the following: student name (A to J), original score, z-score, and pass/fail. For example:

```
A, 150, 1.35, PASS
B, 120, -1.05, FAIL
C, 30, -2.45, FAIL
...  etc, etc
```

GOOD LUCK! :-)