

Computer Science Department  
CPCS202, 1st Term 2019 (Fall 2018-2019)  
Program 3: Numbering Systems Conversion Quiz for High School Students  
Assigned: Sunday, October 28<sup>th</sup>, 2018  
**Due: Sunday, November 11<sup>th</sup>, 2018, or LATE (25% deduction) by Monday**

Course Learning Outcomes (CLOs 1,2,3,4,5,6,7, 8, 13)	Student Outcomes SOs (c, c, b, a, a, a, a, a, a)
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**Purpose:**

The purpose of this assignment is to use loops in a real-world problem.

**Read Carefully:**

- This program is worth **6%** of your final grade.
- **WARNING:** This is an individual assignment; you must solve it by yourself. Any form of cheating will result in receiving **-4%** (less than zero) in the program.
- The deadline for this project is by **10:59 PM on Sunday, November 11<sup>th</sup>, 2018.**
  - **Note:** once the clock becomes 10:59PM, the submission will be closed! Therefore, in reality, you must submit by 10:58 and 59 seconds.
- **LATE SUBMISSION:** you are allowed to make a late submission, but there is a penalty. If you submit **within 24 hours** of the due date (so on Monday by 10:59 PM), you will receive a 25% deduction. You will NOT be able to submit after this date/time.
- **Blackboard Submission:**
  - This assignment must be submitted online via blackboard
  - If your file is empty or you upload the wrong file, it will be solely your responsibility, and your grade will be **zero**.
  - Your program (source file) should be named as:  
SectionNameStudentIdAssignmentNumber.java  
**Example:** CA1110348Ass3.java

## **Problem Description:**

### **Numbering Systems Conversion Quiz for High School Students**

Integrating Computer Science in school education is emerging as a new direction in advanced education systems. In a local high school, a technology teacher has taught his students about the numbering systems conversions. Students were taught that a decimal number, which is used in their daily lives, is represented in computers as a binary number. A binary number consists of a sequence of 0s and 1s. Students have also learned how to convert a decimal number to a binary number and *vice versa*. In addition, since binary numbers can be very large and cumbersome, the teacher has explained to the students that hexadecimal numbers are usually used to abbreviate binary numbers. Students have also learned how to convert numbers from decimal to hexadecimal and *vice versa*.

At the end of this learning module on numbering systems, student must take a computerized practice quiz. Your job is to write a program that implements this practice quiz. The quiz consists of 4 parts and in each part, students are asked 2 random questions (Total = 8 questions). The four parts of the quiz are as follows:

#### **1. Convert from Decimal to Hexadecimal (2 questions)**

For this part of the quiz, a student is asked two questions. For each question, a random decimal number between 0 and 255 is generated, and the student is asked to enter the equivalent hexadecimal number.

#### **2. Convert from Decimal to Binary (2 questions)**

For this part of the quiz, a student is asked two questions. For each question, a random decimal number between 0 and 255 is generated, and the student is asked to enter the equivalent binary number.

#### **3. Convert from Hexadecimal to Decimal (2 questions).**

For this part of the quiz, a student is asked two questions. For each question, a random hexadecimal number of 2 digits is generated, and the student is asked to enter the equivalent decimal number.

#### **4. Convert from Binary to Decimal (2 questions)**

For this part of the quiz, a student is asked two questions. For each question, a random binary number of 8 bits is generated, and the student is asked to enter the equivalent decimal number.

### **Important Remarks about the quiz implementation:**

1. Each question is worth 2 points and the final grade is out of 16.
2. For each question, the student will be given 3 trials to answer the question.
3. If the answer is correct in any of the trials 1 through 3, an appropriate message is displayed (e.g., Correct Answer!).
4. If the maximum number of trials is exceeded, the student will lose the points for that question and an appropriate message is displayed (e.g., Sorry, you have exceeded the maximum number of trials for this question!).
5. At the end of the practice quiz, the student's answers for all of the questions and a number of statistics are displayed. The statistics include:
  - a. A percentage grade out 100% (you need to convert the grade out of 16 to a percentage).
  - b. The time taken to take the quiz from beginning to end.
  - c. The passing percentage for the practice quiz is 60%, an appropriate message is displayed indicating whether or not a student has passed the test (e.g., You didn't pass the quiz!).
6. After each quiz is finished, the program should ask the user to continue for another quiz or not until the user choose to stop taking quizzes. **Please see output in the SAMPLEOUTPUT file.**

### Hints:

1. For explanations about the numbering systems conversion (please refer to Appendix F of your text book)
2. YOU CAN USE any of the Math or String methods studied in Chapter 4.

### You Should Not USE:

Any of the methods in the **Integer** class to convert an integer number to binary or hexadecimal. In other words, using **Integer.toBinaryString (num)** or **Integer.toHexString (num)** is **NOT ALLOWED**.

### Grading Details

Your program will be graded upon the following criteria:

- 1) Adhering to the implementation specifications listed on this write-up.
- 2) Your algorithmic design.
- 3) Correctness.
- 4) Your program should include a header comment with the following information: your name, **email**, course number, section number, assignment title, and date.
- 5) Your program should look EXACTLY like the given sample run.
- 6) The grade distribution:
  - a. **Generating random numbers for each type of question 30%**
  - b. **Correct Conversion of the random number to the requested 60%**
  - c. **Output Format and Organization 10%**

### Deliverables

You should submit one Java file containing the Java code.

\*\*\*This file should be on the format **SectionName\_StudentId\_AssignmentNumber**. If they are not in this format, you will lose points.

**NOTE: your name, ID, section number AND EMAIL should be included as comments in all files!**

### Suggestions:

- Read AND fully understand this document BEFORE starting the program!
- Next, make your algorithm, pseudo code, and flowchart (do not submit these).
- Once the solution is 100% clear to you, then begin making your code.

All the Best!

**Final suggestion: START EARLY!**