

# Assignment # 3

Introduction to Computer Science  
CSC1-UA- 0101

**Due date is 10/10 by 11:55 PM**

**Re-design Assignment #2 and implement user-defined methods  
for part1 and Part2.**

**Try to modularized your program and re-use code to make the program more  
efficient.**

**If you don't use methods then you will receive a zero in this assignment!**

## Code of Conduct

All assignments are graded, meaning we expect you to adhere to the academic integrity standards of NYU. To avoid any confusion regarding this, we will briefly state what is and isn't allowed when working on an assignment.

Any document and program code that you submit must be fully written by yourself. You can, of course, discuss your work with fellow students, as long as these discussions are restricted to general solution techniques. Put differently, these discussions should not be about concrete code you are writing, nor about specific results you wish to submit. When discussing an assignment with others, this should never lead to you possessing the complete or partial solution of others, regardless of whether the solution is in paper or digital form, and independent of who made the solution. That means, you are also not allowed to possess solutions by someone from a different year or course, by someone from another university, or code from the Internet, etc. This also implies that there is never a valid reason to share your code with fellow students, and that there is no valid reason to publish your code online in any form.

Every student is responsible for the work they submit. If there is any doubt during the grading about whether a student created the assignment themselves (e.g. if the solution matches that of others), we reserve the option to let the student explain why this is the case. In case doubts remain, or we decide to directly escalate the issue, the suspected violations will be reported to the academic administration according to the policies of NYU (see <https://cs.nyu.edu/home/undergrad/policy.html>).

## Assignment # 2 Details

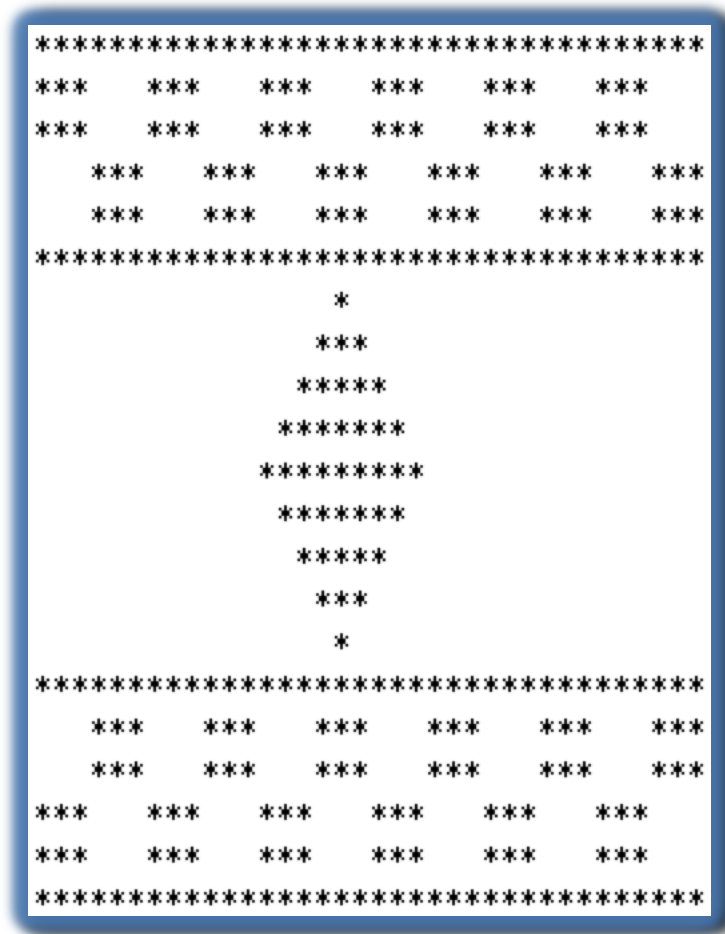
Redesign same requirements but implement user-defined methods! You will notice that the rug might not be a perfect symmetry, but that's ok. Just try your best.

### **Part 1 (50 points): Weaving a Kilim Carpet Application** **Weaving a Kilim Carpet Application using loops and nested loops:** **Save as Part1.java**

Kilims are woven carpets which generally use symmetrical designs. For this assignment, instead of using a loom, wool, and a shuttle, we are asking you to produce a pattern of your own design using loops and nested loops.

Write a program to weave **your own Kilim carpet** with 30 rows by 30 columns. The patterns should be **designed by you (it should be different than the design of carpet below)**. **Your carpet though MUST include at least one diamond shape, checkerboards, and squares** (See example below for these patterns). **Also, use other characters such as \$ or % or + or @ rather than a "\*" to weave the rug. Make sure not to copy the entire pattern from the below rug or copy patterns from another student!** Show your creativity by weaving a different design while meeting the requirements mentioned above. You will get extra credit for excellent design and added features.

**Here is a 12<sup>th</sup> Century Moroccan Kilim Carpet sample pattern made of 25 rows and 36 columns:**  
**(This design is made up of stars (asterisks) and spaces, please ignore the border, color, and the shading effect):**



### Here are the requirements:

- Every print statement should print no more than one character such as '\*' or one space ' '. Do not use statements such as: `print("*****")` but rather use loops for every repetition.
- Use loops and nested loops to produce these patterns.
- You can't use control structure such as switch or if/ else if /else in your program.
- You have to design your own carpet (different than the carpet from above).
- Your carpet MUST include at least one diamond shape, checkerboards, and squares. (see example from above for these patterns).
- Some of the patterns are repeated; you might want to first isolate the elements in the design (eg. the first two rows, the "checkerboard" elements, the triangle) and then combine them to form the "rug".

- If the Dimond is too difficult to produce as one pattern, you can break it into 4 triangles or apply any solution you see fit as long you comply with the assignment's requirements.
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## **Part2 (50 points):**

**Redesign same requirements but implement user-defined methods!**

## **Number System Conversion Application using loops:**

**Save it as Part2.java**

Number system helps to represent numbers used for humans and computers. Computers, in general, use binary numbers 0 and 1 to keep the calculations simple and to keep the amount of necessary circuitry less, which results in the least amount of space, energy consumption and cost. When we type any letter or word, the computer translates them into numbers (binary, base 2) since computers can understand only numbers. A computer can understand only a few symbols called digits and these symbols describe different values depending on the position they hold in the number. In general, the binary number system is used in computers. However, the octal, decimal and hexadecimal systems are also used sometimes. Numbers can be represented in any of the number system categories like binary, decimal, hex, etc. Number conversion is extremely important for computer scientist and therefor, you are asked to build an application to convert between these four number systems mentioned here. I'm aware that there are many of these programs posted on the web but you **MUST** produce your own as we have access to plagiarism software that allows us to detect plagiarism from the web and from any other student work from past years or this year. Please refer to the plagiarism policy posted on the syllabus.

**The following is a diagram of converting numbers from 1 to 15 in all four number systems:**

| Decimal | Binary | Octal | Hexadecimal |
|---------|--------|-------|-------------|
| 0       | 0000   | 000   | 0000        |
| 1       | 0001   | 001   | 0001        |
| 2       | 0010   | 002   | 0002        |
| 3       | 0011   | 003   | 0003        |
| 4       | 0100   | 004   | 0004        |
| 5       | 0101   | 005   | 0005        |
| 6       | 0110   | 006   | 0006        |
| 7       | 0111   | 007   | 0007        |
| 8       | 1000   | 010   | 0008        |
| 9       | 1001   | 011   | 0009        |
| 10      | 1010   | 012   | A           |
| 11      | 1011   | 013   | B           |
| 12      | 1100   | 014   | C           |
| 13      | 1101   | 015   | D           |
| 14      | 1110   | 016   | E           |
| 15      | 1111   | 017   | F           |

Number system conversion

Your application allows the user to enter a number in a specific numbers system chosen by the user and then your program converts this number to the number system that the user has chosen.

**For example, here is a sample run of the program:**

Enter the name of the number system to convert from: bin, or dec, or oct or hex: **bin**

Enter number as a String: **0111**

Enter the name of the number system you want to convert to: bin, or dec, or oct or hex: **dec**

The result is: **7**

**Here is information on algorithms for converting between number systems:**

- Algorithm to convert from binary (base 2) to any system and from any number system to binary <https://byjus.com/maths/number-system-conversion/>
  - Make sure that the binary when inputted and outputted to retain it's left zero digits. So input the binary as a string, extract each character from the string using charAt():

- `char letter = stringName.charAt(index)`
- Then convert from char to int using `Character.getNumericValue(letter)`.
- Algorithm to convert from Decimal (base 10) to any other number system and from any number system to Decimal <https://byjus.com/maths/number-system-conversion/>
- Algorithm to convert from Hexadecimal (base 16) to any other number system and from any number system to Hexadecimal: <https://byjus.com/maths/hexadecimal-number-system/>
- Algorithm to convert from Octal (base 8) to any other number system and from any number system to Octal: <https://byjus.com/maths/octal-number-system/>

#### **Requirements:**

- To keep thing simple for you, use the range of numbers entered by user in your program between 0 and 15 (the same range provided by the above table) allowing you to test and see the result easily as all of the answers is provided by the table above.
- You can use a String to input the number especially in the case of binary so you don't lose the leading zeros on the left when you input the number.
- Do NOT USE already Built-in method fin java for conversions. You should produce your own algorithms (code) to convert from one system to another.
- You MUST use loops for efficiency.
- Please get started on the assignment immediately, and contact the class tutors as soon as possible with any questions. Don't expect a response the day before the due date as tutors get very busy.
- **Extra credit for added features and for producing excellent and efficient algorithm.**

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## **Grading Criteria:**

### **A. Program Execution (90%)**

- Meeting all of the requirements of the assignments
- No syntax, logical and runtime errors at all times
- Produces the correct output all of the time for all cases

### **B. Coding Style (10%):**

- Code clear and easy to read
- Proper indentation and spacing
- Good commenting style
- Good identifier names
- Clarity of code - code that's easy to follow

### C. Extra Credit (1 to 5):

For adding excellent technical features and implementing excellent and efficient algorithms

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### Notes about your program:

- ***Style counts*** (that includes using meaningful names and providing sufficient comments in the body of the programs).
- Make sure your program includes a comment at the beginning with your name, date, along with a brief synopsis of the program/algorithm using the multiline comment `\* */`.
- You should use comments throughout the source code to explain key steps and calculations
- You should use proper indentation (three or two spaces) and blank lines (or you can leave to the default of the text editor default spacing) to make your program easy to read
- Capitalize the first letter of the program name or class names (Prog1.java)
- Choose intuitive names for variables and all identifiers such as names of programs, function or method names.
- You should use blank lines where appropriate to make your program easy to read.
- Make sure that your program does not contain any syntax errors, or logical or runtime errors.
- Make sure to use proper indentation after `{` with two spaces or whatever your editor default spacing is.
- Make sure to only submit your .java files with no errors to Brightspace. Place all the .java files inside a folder saved as FirstNameLastNameAsg2 and then zip the folder and submit it to Brightspace. No need to submit the .class files.

- Late submissions will be penalized by 5% per 24 hours and it will not be accepted after the 3 days past the due date.
  - Note that your solution must work with no errors to be accepted. In case your program does not work using java, your submission will get a zero.
  - Make sure to check the lateness, extension, and plagiarism policy provided in the syllabus.
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## Submission

Make sure to submit the assignment by the deadline as there a penalty for each date late (see homework Late Policy on the website) to Brightspace under the assignment posted by midnight in your time zone. Put all the .java files in a folder. The folder should be named with your name and the assignment number with no spaces such as **GraceHopperAsg2.zip** and place all the .java files needed for this assignment inside this folder and then zip it and submit it to BrightSpace.