

**CSE 142, Spring 2008**  
**Programming Assignment #2: Space Needle (16 points)**  
**Due Tuesday, April 15, 2008, 4:00 PM**

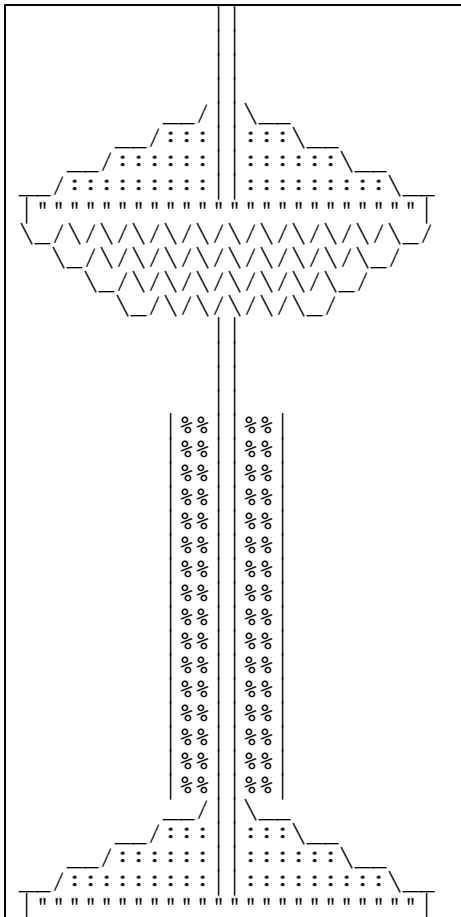
This two-part assignment tests your understanding of expressions, variables, `for` loops, and class constants, and also reinforces previous material on static methods and `println`. Turn in two Java programs described below.

**Part A: Text Art (2 points):**

The first part of your assignment is to write a program that produces any text art (sometimes called "ASCII art") picture you like. Write a Java class named `TextArt` in a file named `TextArt.java`. Your program can produce any text picture you like, with the following restrictions and details:

- The number of lines drawn should be at least 3 but less than 200, and no more than 100 characters per line.
- The code should use at least one `for` loop but should not contain infinite loops. You should use `for` loops and method calls to draw most of the image.
- The picture must not be identical to your solution for Part B or consist entirely of reused Part B code.
- If your Part A program compiles and runs successfully and meets the above constraints, it will receive the full 2 points. Part A will not be graded on style ("internal correctness").

We'll post the images anonymously on the course web page. If we see one that has some cool patterns, it just might turn into a homework assignment for a future quarter!



**Part B: Space Needle (14 points):**

The second part of your assignment is to produce a specific text figure that is supposed to look like Seattle's Space Needle. Turn in a file named `SpaceNeedle.java`. You should **exactly** reproduce the format of the output at left. This includes having identical characters and spacing.

One way to write a Java program to draw this figure would be to write a `System.out.println` statement that prints each line of the figure. However, this solution would not receive full credit. A major part of this assignment is showing that you understand `for` loops.

In lines that have repeated patterns of characters that vary in number from line to line, represent the lines and character patterns using nested `for` loops. It may help to write pseudocode and tables to understand the patterns, as described in the textbook and lecture.

Another significant component of this assignment is the task of generalizing the program using a class constant that can be changed to adjust the size of the figure. See the next page for a description of this constant and how it should be used in your program.

The course web site will contain files that show you the expected output if your size constant is changed to various other values. You can use our Output Comparison Tool to measure numbers of characters.

## Stylistic Guidelines:

### Use of for loops (nested as appropriate)

This program is intended to test your knowledge through Chapter 2, especially nested for loops. If you like, you may also use the Java features from Chapter 3 such as parameters, although you are not required to do so and will receive no extra credit for doing so. You may not use any constructs beyond Chapter 3.

### Use of static methods for structure and elimination of redundancy

Continue to use static methods to structure your solution in such a way that the methods match the structure of the output itself. Avoid significant redundancy; use methods so that no substantial groups of identical statements appear in your code. No `println` statements should appear in your `main` method. You do not need to use methods to capture redundancy in partial lines, such as the two groups of colons in the following line:

```
__/:::::::|:::::::\__
```

### Source code aesthetics (commenting, indentation, spacing, identifier names)

You are required to properly indent your code and will lose points if you make significant indentation mistakes. See the textbook and lecture slides for examples of proper indentation. No line of your code should be over 100 characters long.

Give meaningful names to methods and variables in your code. Follow Java's naming standards about the format of `ClassNames`, `methodAndVariableNames`, and `CONSTANT_NAMES`.

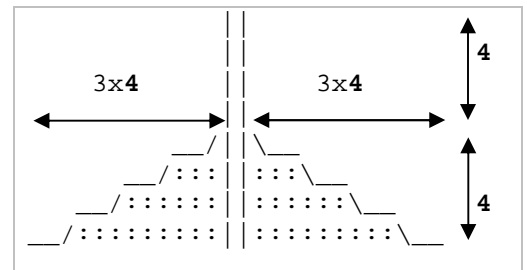
Include a comment at the beginning of your program with basic information and a description of the program. **Also include a comment at the start of each method**, describing that method's behavior. Your comments should be written in your own words.

### Class constant for figure's size

You should create one (and only one) class constant to represent the size of the pieces of the figure. Use **4** as the value of your constant. Your figure must be based on that exact value to receive full credit.

On any given execution your program will produce just one version of the figure. However, you should refer to the class constant throughout your code, so that by simply changing your constant's value and recompiling, your program would produce a figure of a different size.

Your program should scale correctly for any constant value of 2 or greater.



Please note that the height of the needle's midsection grows as the square of the figure size. In the default figure size of 4, the midsection is 16 lines tall. If the size were 7, the midsection would be 49 lines tall.

## How to Get Started:

This program is best completed in stages. We recommend that you do not worry about the constant at first. Write an initial program without a constant, using loop tables or pseudocode to help you deduce the patterns in the output. After your figure looks correct at the default size, begin a second version with the constant. See Chapter 2's case study for an example program that uses a constant while drawing a figure.

Turn in your two Java files electronically from the Homework section of the web site. Part B will be graded on its "external correctness" (whether the program compiles and produces exactly the expected output) and its "internal correctness" (whether your source code follows the stylistic guidelines in this document). As a point of reference, our solution to Part B has 5 methods besides `main` and occupies **96 lines** including comments and blank lines, though you do not have to match these totals exactly.