CS 3824
Homework Assignment 1

Given: August 20, 2015 **Due:** September 12, 2015

General directions. The point value of each problem is shown in [ ]. Each solution must include all details and an explanation of why the given solution is correct. In particular, write complete sentences. A correct answer without an explanation is worth no credit. The completed assignment must be turned in as a PDF through Scholar by 5:00 PM on September 12, 2015. **No late homework will be accepted.**

Digital preparation of your solutions is mandatory. Use of LaTeX is optional, but encouraged. No matter how you prepare your homework, **please include your name.**

Use of LaTeX (optional, but encouraged).

- Retrieve this LaTeX source file, named `homework1.tex`, from the course web site.
- Rename the file <*Your VT PID*>`_solvehw1.tex`, For example, for the instructor, the file name would be `heath_solvehw1.tex`.
- Use a **text editor** (such as `vi`, `emacs`, or `pico`) to accomplish the next three steps.
- Uncomment the line

  `% \setboolean{solutions}{True}`

  in the document preamble by deleting the `%`.
- Find the line

  `\renewcommand{\author}{Lenwood S. Heath}`

  and replace the instructor's name with your name.
- Enter your solutions where you find the LaTeX comments

  `% PUT YOUR SOLUTION HERE`
- Convert your solutions to PDF and submit your solutions through Scholar by 5:00 PM on September 12, 2015.

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[50] 1. Jones and Pevzner problem 4.4.

Note that the problem is to generate m-element multisets that are subsets of a multiset S having n elements. To be concrete, you may assume that a multiset is represented as an (unordered) list of integers. Give your algorithm in pseudocode. Then, implement the algorithm in a programming language of your choice. Test your implementation on input

$$\begin{aligned} m &= 3 \\ S &= \{4, 9, 16, 1, 4, 7\}. \end{aligned}$$

Include the source of your implementation in your solution document. Also, include the solution you get for the test input.

A O bound on the worst-case time complexity of your algorithm is a function of n and m. This is difficult to determine, so you are not required to do so. However, feel free to give it a try.

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[25] 2. Jones and Pevzner problem 4.12.

Give pseudocode for your algorithm, along with an English explanation of how it works. Determine a O bound on its worst-case time complexity as a function of the lengths of T and s. (Use $|T|$ and $|s|$ for these lengths.)

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[25] 3. Jones and Pevzner problem 4.13.

Give pseudocode for your algorithm, along with an English explanation of how it works. Determine a O bound on its worst-case time complexity as a function of the lengths of T and s and of k.
