CSE 417
Algorithms & Computational Complexity
Assignment #1
Due: Wednesday, 1/16/19

Instructions:

We will have many homeworks to route among the TA's. Chaos will ensue (and points will be lost) unless you pay attention to the following:

- **Due Dates:** Generally Wednesdays, at the start of class; our **late policy** is on the course home page.
- **"Algorithms":** When a problem says "give an algorithm," unless explicitly stated otherwise, it *always* means **algorithm** (English overview plus high-level pseudo-code, as efficient as you can manage), **correctness** argument and **run time** analysis. See the FAQ page for more on this, including the level of detail expected.
- **Handwriting:** Typed solutions are strongly encouraged, since (a) handwriting is often hard to read/grade, and (b) your ability to easily revise will lead you to clearer writing, clearer thinking (and perhaps more points). To type the math:
  - Word's equation editor is fine, tho I personally find it somewhat cumbersome.
  - Other word proccessors are probably fine, similarly.
  - Plain text files (suffix .txt) are fine, provided you're clear about subscripts and other math notation. E.g., I recommend `x_{i,j}^{2}` for "the square of x sub i,j".
  - LaTeX is excellent for math. Like all good tools, it has a learning curve, but the basics are easy. E.g., `x_{i,j}^{2}` → $x_{i,j}^2$ and `{{n}\choose{k}}` → $\binom{n}{k}$. Here is a brief intro. (Let us know if you find other useful tutorials.) It may be preinstalled in some campus labs, and has simple, free installers for Windows, Mac and Unix.
  - Even typed prose with handwritten math is welcome, esp. if your handwriting is as bad a mine...
- **Mechanics:** Assignments must turned in *electronically*, not on paper. These details are important; read carefully.
  - If your solution is partially or completely handwritten, then scan it to generate an electronic file. Many campus labs have scanners you may use. (Perhaps this link points to some? Please let us know if you have better suggestions.) In a pinch, a carefully lit, focused shot from a good camera-phone may suffice, but DO test this before the last minute... In any case:
  - Make sure your name, student number and uwnetid are clearly on the front page.
  - Arrange your file so that the problems appear in numerical order.
  - If at all possible, start each problem on a new page.
  - *Do **not** turn in word processor **source** or other files (.doc, .docx, .pages, .tex, .xps, ...) unless accompanied by .pdf versions; we've had myriad compatibility issues.*
  - We strongly prefer that you turn in a single file containing all of your solutions. If for some reason you can't do that, put all files in one folder, name the files so that their order is obvious, name the *folder* something distinct like your_name_hw1, the *compress* the folder with a zip utility and turn in the single resulting zip archive ("your_name_hw1.zip").
  - In all cases, make sure pages are in order, legible, not rotated, not upside down, ...
  - Finally, upload your file to the Canvas dropbox. (You could use email to cse417-staff.washington.edu in an *emergency,* but avoid it if at all possible, even for late submissions; the Canvas dropbox is strongly preferred, and much more reliable. Likewise, paper is OK in an *emergency,* but I'm much more likely to lose it, and neither of us want that...)

Important Note:

For all homework assignments this quarter, it is a violation of my academic integrity policy for you to search for, read, or use solutions to these or similar problems written by others. You may discuss these problems with other students in this class, but you must *write your solutions on your own*.

Problems:

1. [10 points] KT Chapter 1, problem 1, page 22. (.jpg image)
2. [10 points] KT Chapter 1, problem 2, page 22. (.jpg image)
3. [10 points] KT Chapter 1, problem 4, page 23. (.jpg image) You may omit a runtime analysis, but write a paragraph explaining why your algorithm is correct. (This doesn't have to be very formal, but do try to make it convincing.)
4. [10 points] KT Chapter 2, problem 2, page 67. (.jpg image) In (d), assume $\log_2$.
5. [10 points] KT Chapter 2, problem 3, page 67. (.jpg image) **Extra Credit:** say, and prove, which of the relations are actually Θ, rather than just big-O.
6. [10 points] KT Chapter 2, problem 5, page 68. (.jpg image)