# Homework 4 Solutions

CSC 140 – Advanced Algorithm Design and Analysis

If you find any errors in the solution writeup, please let me know. Ask in class or come to office hours if you need any further help understanding the problems and their solutions.

**5.2-4)** See book solution at `https://mitpress.mit.edu/books/introduction-algorithms-third-edition`

**5.2-5)** See book solution at `https://mitpress.mit.edu/books/introduction-algorithms-third-edition`.

**7.1-1)** There are four areas during Partition: less-or-equal, greater, not-looked-at, and pivot. The following lines show the four regions over time. The first line is the four regions before anything happens. Each subsequent line shows the state after the next not-looked-at item has been identified as less-or-equal (resulting in a swap) or greater (resulting in no swap) and the partition boundaries updated. The final line shows the result of swapping the pivot with the item to the right of the last less-or-equal item.

⟨||13 19 9 5 12 8 7 4 21 2 6|11⟩
⟨|13|19 9 5 12 8 7 4 21 2 6|11⟩
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⟨9 5|13 19|12 8 7 4 21 2 6|11⟩
⟨9 5|13 19 12|8 7 4 21 2 6|11⟩
⟨9 5 8|19 12 13|7 4 21 2 6|11⟩
⟨9 5 8 7|12 13 19|4 21 2 6|11⟩
⟨9 5 8 7 4|13 19 12|21 2 6|11⟩
⟨9 5 8 7 4|13 19 12 21|2 6|11⟩
⟨9 5 8 7 4 2|19 12 21 13|6|11⟩
⟨9 5 8 7 4 2 6|12 21 13 19||11⟩
⟨9 5 8 7 4 2 6|11|21 13 19 12|⟩

If asked to do a similar problem on a quiz or exam, attention to detail is key to getting credit, so study this algorithm and this simulation carefully so that you can do something similar in a quiz or exam.