Brute-Force algorithms

- Read 3.1, pages 97-101

  - What is the main idea behind the "brute force" approach?
  - The book lists at least four possible reasons why a brute-force solution to a problem might be desirable. What are they?
  - You can see visualizations of the various sorting algorithms on this site: https://visualgo.net. I strongly encourage you to play around with it, and visually see the three sorting algorithms we have seen so far (Counting, Selection, Bubble).
  - Study the **SelectionSort** algorithm.
    * What is the main idea of the SelectionSort algorithm?
    * Explain the use of the double-for loop, and in particular the indices for each loop.
    * What does the variable min represent in the loop? Be precise.
    * At intermediate steps of the algorithm, what part of the array, if any, is sorted?
    * Study Figure 3.1 which shows a run of the algorithm. What is the meaning of the vertical lines?
    * Is SelectionSort an in-place algorithm? Is it a stable algorithm?
    * Analyze the time complexity of SelectionSort.
    * Is there a difference in SelectionSort between best-case and worst-case?
    * How many entry swaps are needed for SelectionSort?
      · Why might we care about this?
    * The pseudocode is presented assuming the list of numbers is stored as an array. Do you think the algorithm could work if the numbers were stored as a linked list? What would need to change?
    * Practice problems: 3.1.8, 3.1.10
  - Study the **BubbleSort** algorithm.
    * What is the main idea of BubbleSort? Why is it called that?
    * Explain the use of the double-for loop, and in particular the indices for each loop, especially the inner loop.
    * At intermediate steps of the algorithm, what part of the array, if any, is sorted?
    * Study Figure 3.2 which shows a run of the algorithm. What is the meaning of the vertical lines?
    * Is BubbleSort an in-place algorithm? Is it a stable algorithm?
    * Analyze the time complexity of BubbleSort.
    * Is there a difference in BubbleSort between best-case and worst-case?
    * How many entry swaps are needed for BubbleSort?
    * Practice problems: 3.1.11, 3.1.14