**Advanced Algorithms**

**Exercise for Lecture 3**

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| **Student Name** |  | **Student ID** |  |
| **Problem 1** |  | | |
| **Problem 2** |  | | |
| **Problem 3** |  | | |
| **Problem 4** |  | | |
| **Total Score** |  | | |
| **Notes** | Deadline: **2023-09-20 24:00**  Submission Format: ‘**Lecture3\_Name\_Student ID.docx**’, and please send to: **[chenlq1997@126.com](mailto:algorithms_23fall@163.com)**.  This assignment is meant to be an evaluation of your **individual** understanding coming into the course and should be completed **without collaboration** or outside help. | | |

**Problem 1.[25 points]** Please prove that COUNTING-SORT algorithm is stable.

**Solution:**

**Problem 2.[25 points]** Please Explain why the worst-case running time for bucket sort is. What simple change to the algorithm preserves its linear average-case running time and makes its worst-case running time ?

**Solution:**

**Problem 3. [25 points]** Please sort the following numbers with radix sort algorithm. And you need to show every step. Only the result won’t get a full score.

784512 895623 486213 794613 579135 741963 369258 864795

**Solution:**

**Problem 4. [25 points]** Please sort the following numbers with shell sort algorithm. And you need to show every step. Only the result won’t get a full score. Please show how to group the data of each step.

8 9 11 7 25 3 15 6 4 0 1 5 2 13 12 18

**Solution:**