# WST540: Quiz 3

**Problem 1.** Let $s =$ `river` and $t =$ `digger`. Answer the following questions.

(i) Recall that, to compute the edit distance between $s$ and $t$, we learned a dynamic programming algorithm which works by filling in a 2d array $A$, such that $A[i, j]$ $(0 \leq i \leq 5, 0 \leq j \leq 6)$ equals the edit distance between $s[1..i]$ and $t[1..j]$. Give the entire $A$ in its final form.

(ii) Give a trace for $s$ and $t$ that corresponds to an editing path that changes $s$ to $t$ with the minimum operations. Also explain what are these operations.

**Solution.** (i)

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 1 | 1 | 2 | 3 | 4 | 5 | 5 |
| 2 | 2 | 2 | 1 | 2 | 3 | 4 | 5 |
| 3 | 3 | 3 | 2 | 2 | 3 | 4 | 5 |
| 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 |
| 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 |

(ii) Trace: $\{(1, 1), (2, 2), (3, 3), (4, 5), (5, 6)\}$. Operations: substitute `r` with `d`, `v` with `g`, and insert `l`.

**Problem 2.** Let $s =$ `tuesday` and $t =$ `thursday`. The matrix $A$ is provided as follows:

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 5 | 6 | 7 |
| 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | 3 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 6 |
| 4 | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 5 |
| 5 | 5 | 4 | 4 | 4 | 4 | 3 | 2 | 3 | 4 |
| 6 | 6 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 3 |
| 7 | 7 | 6 | 6 | 6 | 6 | 5 | 4 | 3 | 2 |

Which are the cells that determine $A[4, 5] = 2$ and $A[4, 6] = 3$, respectively?

**Solution.** $A[4, 5]$ is determined by $A[3, 4]$. $A[4, 6]$ is determined by $A[4, 5]$.