CS301 - Assignment 0

Muhammed Orhun Gale - 26754

03/13/2022

Problem 1:

(i) Input: Two sets of N elements say $S_1 = \{x_1,....,x_n\}$ and $S_2 = \{y_1,....,y_n\}$ for some n$\in Z^+$.

Output: A set of bijections from S_1 to S_2 or vice versa such that for all bijections (x_m, y_m), $(x_{k_1}, y_{k_2}) \cap (x_{l_1}, y_{l_2}) = \emptyset$ for some $k_1,k_2,l_1,l_1 \in Z^+$ such that $k_1,k_2,l_1,l_1 \leq n$.

(ii) Input: $S_1 = \{w_1,w_2,w_3\}$, $S_2 = \{m_1,m_2,m_3\}$

Output: $S_B = \{(w_2, m_1),(w_3, m_2),(w_1, m_3)\}$

Problem 2:

(i) Pseudocode

```
Do for each w_i of set S_1
{
    Do for each m_j of set S_2
    {
        if m_j is not matched
        {
            Create (w_i, m_j) tuple
        }

        if m_j's coefficient is greater than current match of w_i
        {
            Delete current tuple of w_i
            Create (w_i, m_j) tuple
        }

        else
        {
            Do nothing
        }
```

```
    }

}
```

(ii) Asymptotic Time Complexity

Since we iterate over S_1 and for each element of it iterate S_2, total number of iterations will be N*N then the Asymptotic Time Complexity will be equal to $\mathcal{O}(n^2)$.

Problem 3:

It is in the zip, I could not add in LaTeX. See Problem3 photo