

Lab3

Task a.

2	3	4	5
8	9	12	∞
14	16	∞	∞
∞	∞	∞	∞

Task b.

if $Y[1, 1] = \infty$, As $Y[i, j] \geq Y[1, 1]$, $Y[i, j] = \infty$, Y is empty,

if $Y[m, n] < \infty$, we can set

$Y[i, j], Y[i, j] < Y[i + offset, j], Y[i, j] < Y[i, j + offset]$ for $offset > 0$

Task c.

We know $Y[1, 1] \leq Y[i, j]$, Set $tmp \leftarrow Y[1, 1]$, $Y[1, 1] \leftarrow \infty$, Then we rearrange the Matrix elements to satisfy the rule of Young tableau.

Compare $Y[i, j]$ with $\min(Y[i + 1, j], Y[i, j + 1])$ and Swap them., then we satisfy the property of the young tableau again. Repeat the operation until $Y[i, j] < \min(Y[i + 1, j], Y[i, j + 1])$

Then $T(p) = T(p - 1) + O(1) = \dots = O(p)$

Task d.

Swap $Y[i, j]$ with $\min(Y[i + 1, j], Y[i, j + 1])$ until $Y[i, j] < \min(Y[i + 1, j], Y[i, j + 1])$, Start from $Y[m, n]$, for $i \leftarrow i - 1$ for $j \leftarrow j - 1$. The Time complexity is $O(m + n)$

Task e.

Insert n^2 elements to empty tableau.

Insert: $O(n)$

Total: $O(n^2 * n) = O(n^3)$

Then take $Y[1, 1]$ and restore the tableau, the total Time complexity is $O(n^3)$

Task f.

The algorithm is

```

i:=m
j:=1
while i>=1 and j<=n do
    if Y[i,j]>key then do
        i:=i-1
    else if Y[i,j]<key then do
        j:=j+1
    else
        if i>=1 and j<=n
            return i,j
        end
    end
end
end

```

start from $i \leftarrow m, j \leftarrow 1, cur \leftarrow Y[m, 1]$ if $key < Y[i, j]$ set $i \leftarrow i - 1$ if $key > Y[i, j]$ set $j \leftarrow j + 1$ repeat the operation until $i = 0$ or $j > n$, or $Y[i, j] = key$