

Exercise Sheet 6

Problem 1

In [56]: `import copy`

- Initialise(m)

Create a dictionary with length m . KEY are the index of items (i.e., $0, \dots, m$;) VALUES are initially set to 0. Since inserting a value in a dictionary is $O(1)$, initialise the whole dictionary should be $O(m)$

In [114... `def create_dict(m):`
 `key_m = [str(i) for i in range(m)]`
 `d_m = dict.fromkeys(key_m, [0])`
 `return d_m`

In [115... `a = copy.deepcopy(create_dict(6))`
`a`

Out[115... `{'0': [0], '1': [0], '2': [0], '3': [0], '4': [0], '5': [0]}`

- Update(i, x) and get(i)

Update the i th value is to append the new value to the list corresponding to the KEY whose value is i , hence the running time is $O(1)$; Get(i) is to return the last value of the list corresponding to the KEY, simply by `dict[i][-1]`, the running time is $O(1)$.

In [116... `def update(l, i, x):`
 `l[str(i)] = l[str(i)] + [x]`

`update(a, 3, 5)`
`print(a)`

`{'0': [0], '1': [0], '2': [0], '3': [[0], 5], '4': [0], '5': [0]}`

- Undo()

undo is to pop the end of the list corresponding to the KEY whose value is i , its running time is $O(1)$.

In [102... `def undo(l, i):`
 `l[str(i)].pop()`

`undo(a, 3)`

`{'0': 0, '1': 0, '2': 0, '3': [0], '4': 0, '5': 0}` 6

- Reset()

no idea what's the time complexity of `dict.fromkeys()`

In [105... `def reset(l):`
 `l = dict.fromkeys(l, 0)`
 `return l`

```
{'0': 0, '1': 0, '2': 0, '3': 0, '4': 0, '5': 0}
```

- `count_undo()`

By setting a counter, +1 when operate "update" once, -1 when operate "undo". Return the value of the counter.