

المحاضرة الثالثة

Water Jug Problem

Lists vs Sets

Lists

Ordered: Lists maintain the order of elements as they are added.

Mutable: You can change the elements of a list after it's created (add, remove, modify).

Allow Duplicates: Lists can contain duplicate elements.

Syntax: Defined using square brackets [].

Example: `my_list = [1, 2, 2, 3, 'book']`.

Sets

Unordered: Sets do not maintain any specific order of elements.

Mutable: You can add or remove elements from a set, but you cannot modify existing elements directly.

No Duplicates: Sets automatically remove duplicate elements.

Syntax: Defined using curly braces {} or the set() function.

Example: `my_set = {1, 2, 3, 'book'}` (or `my_set = set ([1, 2, 2, 3, 'book'])`)

Python Code to Extract Edges from Graph

```
graph={
'a':['b','c'],
'b':['a','d'],
'c':['a','d'],
'd':['b','c','e'],
'e':['d']
}
v=graph.keys()
edges=[]
for v in graph:
    for item in graph[v]:
        if {v,item} not in edges:
            edges.append({v,item})
print(edges)
```

#Implementation:

[{'b', 'a'}]

[{'b', 'a'}, {'c', 'a'}]

[{'b', 'a'}, {'c', 'a'}, {'b', 'd'}]

[{'b', 'a'}, {'c', 'a'}, {'b', 'd'}, {'d', 'c'}]

[{'b', 'a'}, {'c', 'a'}, {'b', 'd'}, {'d', 'c'}, {'d', 'e'}]

#Water Jug Problem

```
Print ("Water Jug Problem")
x=int (input ("Enter X:"))
y=int (input ("Enter Y:"))
while True:
    rno=int (input ("Enter the Rule No"))
    if rno==1:
        if x<4:
            x=4
    if rno==2:
        if y<3:
```

```
        y=3
    if rno==3:
        if x>0:
            x=0
    if rno==4:
        if y>0:
            y=0
    if rno==5:
        if x+y>= 4 and y>0:
            x,y=4,y-(4-x)
```

#Water Jug Problem

```
if rno==6:
    if x+y >=3 and x>0:
        x, y=x-(3-y),3
if rno==7:
    if x+y<=4 and y>0:
        x, y=x+y,0
if rno==8:
    if x+y<=3 and x>0:
        x, y=0, x+y
print ("X =" , x)
print ("Y =" , y)
if (x==2):
    print(" The result is a Goal state")
    break
```

#Implementation:

Water Jug Problem

Enter X:0

Enter Y:0

Enter the Rule No **2**

X = 0

Y = 3

Enter the Rule No **7**

X = 3

Y = 0

Enter the Rule No **2**

X = 3

Y = 3

Enter the Rule No **5**

X = 4

Y = 2

Enter the Rule No**3**

X = 0

Y = 2

Enter the Rule No**7**

X = 2

Y = 0

The result is a Goal state