

Exercise 4

1. Create :

1. Empty list
2. Empty Tuple
3. Empty Dictionary
4. Empty Set
5. Tuple with 1 element

Explore using symbols eg. (), [], {} and keywords dict, set, ... use type to verify the type of created structure

2. Write a program to convert between list, tuple and set. See all combinations

- list to tuple
- list to set
- tuple to list
- tuple to set
- set to List
- set to tuple

3. I have a data in the form [(1,2), (2,3), (3,4)] convert it to the form {1:2, 2:3, 3:4 }.

4. Find the first reoccurring element in a list. Eg. if we have a list [1,2,3,1,5], first repeated element is 1. If there are no repeated element return None. What is its time complexity?

5. Write a program to get count of elements in a list. Eg. if we have list [1,2,3,1,2,3,1,2,1] it should return {1:4, 2:3, 3:2}

6. Write a function that takes a list as input and returns a new list with duplicates removed.

7. Create a set containing the elements 'apple', 'banana', and 'cherry'

- how can you check if 'banana' is in the set?
- What about "berry"?
- add the element 'orange' to the set
- remove 'banana' from the set.

8. Given set1 = {1, 2, 3, 4} and set2 = {2, 3, 5}, write code to find the

- union of the two sets
- Intersection of two set
- difference between set1 and set2
- check if set1 is a subset of set2 and if set2 is a superset of set1.

9. Given set1 = {1, 2} and set2 = {1, 2, 3, 4}, write code to check if set1 is a subset of set2 and if set2 is a superset of set1.

10. Write a program to save the content below to a json file

```
data = {
  "company": {
    "name": "TechCorp",
    "employees": [
      {
        "id": 1,
        "name": "Alice",
        "department": "Development",
        "skills": ["Python", "Django", "React"],
        "salary": 75000
      },
      {
        "id": 2,
        "name": "Bob",
        "department": "Development",
        "skills": ["Java", "Spring", "Angular"],
        "salary": 70000
      },
      {
        "id": 3,
        "name": "Charlie",
        "department": "Marketing",
        "skills": ["SEO", "Content Writing"],
        "salary": 60000
      }
    ],
    "location": {
      "city": "New York",
      "country": "USA"
    },
    "products": [
      {"id": "P1", "name": "ProductA", "price": 120.50},
      {"id": "P2", "name": "ProductB", "price": 80.75}
    ]
  }
}
```

11. After saving the data to a json file:

- Load the file from above and check if it is same as the one we saved before.

- For audit purpose we need to add a new key `last_updated` to the data. Add this key and put the current time stamp on it. Remember to Always update it when saving to the file.
- How can I add one more employee to the data. Add employee with id 4 and save it to the file.
- There was a salary increment in the organization so everyone will now get 10% more salary. Read from json file, save the increased salary back to the file.
- The company has a project in Python. Give all the person with Python skill in the company. Do a fresh read from the file before starting.

12. Write a list comprehension to create a list of squares for numbers from 1 to 10.

13. Use a list comprehension to create a list of even numbers from the list `numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]`.

14. Write a dictionary comprehension to create a dictionary where the keys are numbers from 1 to 5 and the values are the cubes of the keys.

15. Use a set comprehension to create a set of unique vowels from the string `sentence = "comprehensions are powerful"`.

16. Given a dictionary `students = {'Alice': 85, 'Bob': 78, 'Charlie': 92, 'David': 63}`, write a dictionary comprehension to create a new dictionary with students who scored above 80.

17. Write a list comprehension to create a list of tuples `(x, y)` where `x` is from `list1 = [1, 2, 3]` and `y` is from `list2 = [4, 5, 6]`. So output will be `[(1,4), (2,5), (3,6)]`