OOP II
Assignment
Mark: 05
Deadline 22 September
Submit the printed hardcopy to the class

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1. Dictionary

A university wants to create a dictionary to store information about courses, where each key is a course code, and the value is another dictionary containing details about the course. The details include the course name, number of credits, and the instructor's name. The university also wants to perform some operations like updating course details, adding new courses, and removing old ones.

Write a Python function that performs the following tasks:

1. Create a dictionary with the following courses:
    - **CSE101**: Course name = "Introduction to Programming", Credits = 3, Instructor = "Dr. Alice"
    - **CSE102**: Course name = "Data Structures", Credits = 4, Instructor = "Dr. Bob"
    - **CSE103**: Course name = "Database Systems", Credits = 3, Instructor = "Dr. Carol"
2. Update the instructor's name for **CSE102** to "Dr. Bob Jr."
3. Add a new course:
    - **CSE104**: Course name = "Algorithms", Credits = 4, Instructor = "Dr. Dave"
4. Remove the course **CSE101** from the dictionary.
5. Loop through the dictionary and print the course code along with its details.

2. String

Suppose you have given a string named sentence as follows:

sentence = "Learning Python is fun and rewarding."

Write a Python program to:

a. Extract the substring "Python is fun" using negative slicing.

b. Modify the original string by replacing "rewarding" with "exciting".

c. Insert the phrase " Keep practicing!" after "exciting" in the modified string without directly concatenating it to the end. Instead, insert it at the correct position programmatically.

d. Capitalize the first letter of each word in the final output.

3. List

You are developing a Python script to manage a customer database for an online store. The customers are stored in lists, and you need to perform several operations on these lists as the store grows. Consider the following list of customer names:

customers = ["Alice", "Bob", "Charlie", "David", "Eve"]

As part of the database management system, you need to:

a. Access the third customer in the list and print their name.
b. Change the name of the second customer to "Ben".
c. Add a new customer named "Frank" to the end of the list.
d. Remove the customer "David" from the list.
e. Sort the customer names alphabetically and print the final list.

Write a Python program that performs these operations and produces the expected final list.

4. Control flow

You are developing a program for a school to analyze student grades and categorize them based on their performance. The grades are stored in an array, and the school uses the following grading scheme:

- **Grade A**: Score above 80
- **Grade B**: Score between 60 and 80
- **Grade C**: Score between 40 and 60
- **Grade F**: Score below 40

You are given an array of student grades:

grades = [85, 78, 92, 45, 33, 67, 88, 41]

Perform the following tasks:

a. Use a for loop with if-else conditions to categorize each student's grade and display their grade category (A, B, C, or F).
b. Implement a function called boost_grades that increases each student's grade by 5%. Use the map() function to apply this adjustment to the grades array and print the new grades.

c. Use a lambda function to find which students' boosted grades are now above 90 and print those grades.

Write the Python code that solves the problem, and show the final output.

Expected output:

Grade Categories:

Score: 85 - Grade: A

Score: 78 - Grade: B

Score: 92 - Grade: A

Score: 45 - Grade: C

Score: 33 - Grade: F

Score: 67 - Grade: B

Score: 88 - Grade: A

Score: 41 - Grade: C

Boosted Grades:

[89.25, 81.9, 96.6, 47.25, 34.65, 70.35, 92.4, 43.05]

Boosted Grades Above 90:

[96.6, 92.4]

5. Tuple & Set

You are developing a Python application to manage a collection of book records and unique tags for a library system.

You have the following data structures:

1. A tuple of book records, where each record contains the title, author, and publication year of a book.
2. A set of unique tags associated with these books.

Here is the initial data:

books = (

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    ("To Kill a Mockingbird", "Harper Lee", 1960),
    ("1984", "George Orwell", 1949),
    ("The Great Gatsby", "F. Scott Fitzgerald", 1925)
)
tags = {"classic", "dystopian", "novel", "literature"}
```

Perform the following tasks: a. Access the second book's author from the books tuple and print it.
b. Add a new record for the book "Brave New World" by Aldous Huxley, published in 1932, to the books tuple. Note that tuples are immutable; you should demonstrate the correct approach to updating the tuple.
c. Unpack the details of the third book into separate variables and print them.
d. Loop through the books tuple and print each book's title.
e. Add a new tag "sci-fi" to the tags set and print the updated set.
f. Use a method to remove the tag "novel" from the tags set and print the updated set.