Introduction to Data Science
Fall 2023
Total marks 60
Due date: 29 Sept, 2023, 05:00 AM

Assignment 1

Instructions:

- All questions must be answered within a single notebook or .py file.
- Follow the file naming conventions: Name your submission file as RollNo.ipynb or RollNo.py (e.g., i22_xxxx.ipynb, where xxxx is your Roll Number).
- Use headings to distinguish each question in the notebook.
- Late submissions will not be accepted and will be given a zero.
- **No external libraries are allowed for this assignment other than the Numpy and Pandas for questions 2 and 3.**
- **Any form of plagiarism will result in a zero for both parties involved.**
- **AI-generated content is prohibited. Detection of such content will lead to a zero score.**

1. **[20 Marks]**

Suppose you have opened a Frozen Yogurt shop that sells frozen yogurt and traditional ice creams. You want to develop a point-of-sale program. Below is the menu of your shop and you have to write a program to automatically calculate the total of each customer order and also generate a report at the end of each day. You must store the customer name and order total in the dictionary.

Every time the same customer purchases some orders you have to update the order total for that customer (add the previous order total to the current order total)

Your program should prompt you to get information from the customer to calculate the order total based on the menu. It should first get the customer's name, if the customer has purchased previously, the program should display the message "Welcome back".

When exiting the program, the program should display the order total for each customer that bought the items, along with the total number of orders, total sales, and average customer orders. Program Sample:

****

Enter your name: Alice
Do you want Frozen Yogurt or Ice cream? (Y: Frozen Yogurt, I: Ice cream) Y
What size? (S: Small, M: Medium, L: Large) m
What kind of container? (V: Cone, U: Cup) u
Do you like to add a topping? (Y: Yes, N: No) y
What topping do you like? (G: Gummies, N: Nuts) g
Do you like to have cookies? (Y: Yes, N: No) y
What kind of cookies? (R: Raisin, C: Chocolate) r
And the size? (R: Regular, L: Large) r
What day of the week is this? (1:Monday, 2:Tuesday, 3:Wednesday, 4:Thursday, 5:Friday, 6:Saturday, 7:Sunday) 3

Your order total is $7.07

****

Enter C to continue or Q to quit: C

****

Enter your name: John
Do you want Frozen Yogurt or Ice cream? (Y: Frozen Yogurt, I: Ice cream) I
What size? (S: Small, M: Medium, L: Large) L
What kind of container? (V: Cone, U: Cup) v
Do you like to add a topping? (Y: Yes, N: No) y
What topping do you like? (G: Gummies, N: Nuts) n
Do you like to have cookies? (Y: Yes, N: No) y
What kind of cookies? (R: Raisin, C: Chocolate) c
And the size? (R: Regular, L: Large) L
What day of the week is this? (1:Monday, 2:Tuesday, 3:Wednesday, 4:Thursday, 5:Friday, 6:Saturday, 7:Sunday) 6

Your order total is $8.97

****

Enter C to continue or Q to quit: Q

****

Customer Name	*Order Total*
Alice	$7.07
John	$8.97

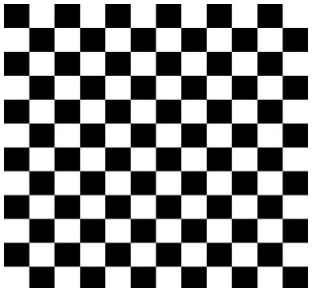
Item	**#Order**	**Order Total**	**Average per Order**
Frozen Yogurt	2	10.16	5.08
Ice Cream	2	12.46	6.23
Grand Total	4	22.62	5.66

Table 1: Sales report

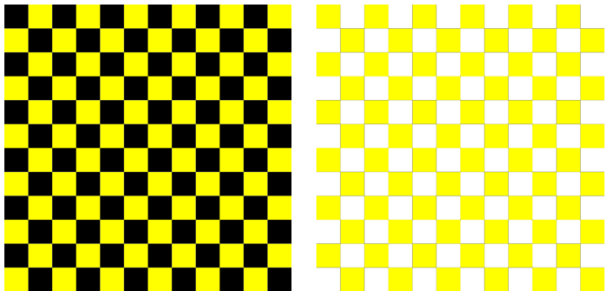
NOTE: The above is just a sample report, the report that your program will generate at the end should be based on the purchases made by the customers. Make sure you handle both small or upper-case input letters (the program should accept both) provided by the user.

2. **[20 Marks]**

   Given an image containing a black and white checkered pattern



   your task is to use the **Numpy arrays** to modify the color of the checkered pattern according to your preference. Refer to the example outputs below for reference.

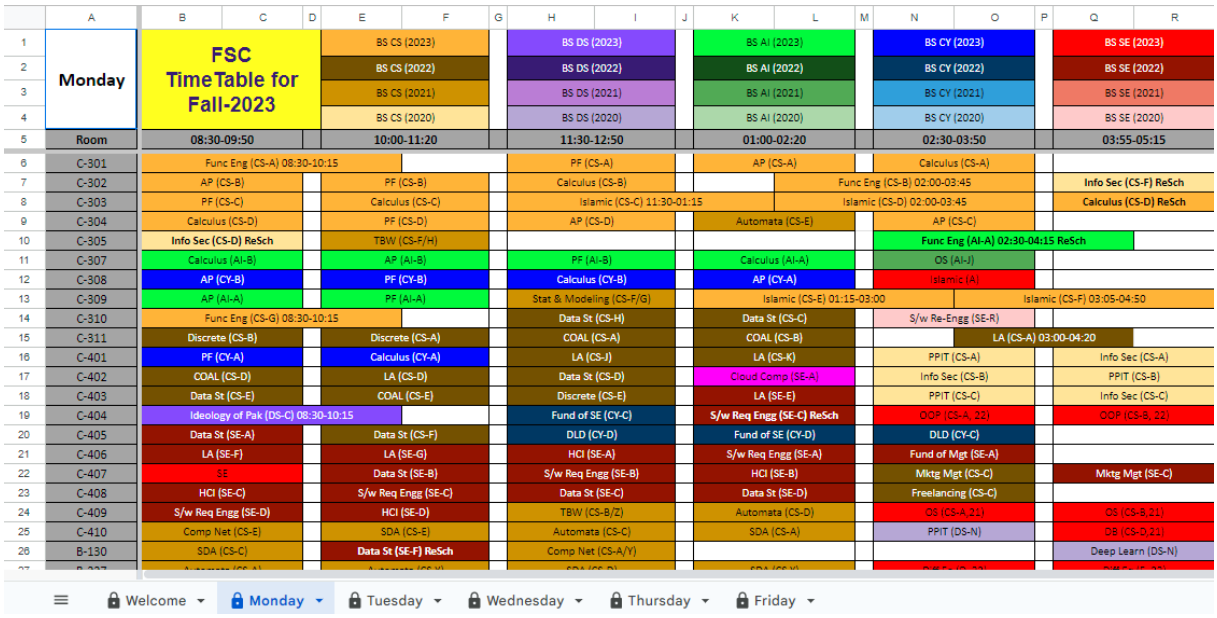


   Note: Starter code for image reading and conversion to NumPy array is provided in the attached notebook. You can use the Matplotlib library for image plotting.

3. **[20 Marks]**

   Currently, the FAST NUCES Timetable looks like this:

   Your task is to convert the timetable into a Pandas dataframe having the following attributes



	Monday	FSC TimeTable for Fall-2023	BS CS (2023)	BS DS (2023)	BS AI (2023)	BS CY (2023)	BS SE (2023)
			BS CS (2022)	BS DS (2022)	BS AI (2022)	BS CY (2022)	BS SE (2022)
			BS CS (2021)	BS DS (2021)	BS AI (2021)	BS CY (2021)	BS SE (2021)
			BS CS (2020)	BS DS (2020)	BS AI (2020)	BS CY (2020)	BS SE (2020)
	Room	08:30-09:50	10:00-11:20	11:30-12:50	01:00-02:20	02:30-03:50	03:55-05:15
	C-301	Func Eng (CS-A) 08:30-10:15		PF (CS-A)	AP (CS-A)	Calculus (CS-A)	
	C-302	AP (CS-B)	PF (CS-B)	Calculus (CS-B)	Func Eng (CS-B) 02:00-03:45		Info Sec (CS-F) ReSch
	C-303	PF (CS-C)	Calculus (CS-C)	Islamic (CS-C) 11:30-01:15	Islamic (CS-D) 02:00-03:45		Calculus (CS-D) ReSch
	C-304	Calculus (CS-D)	PF (CS-D)	AP (CS-D)	Automata (CS-E)	AP (CS-C)	
	C-305	Info Sec (CS-D) ReSch	TBW (CS-F/H)			Func Eng (AI-A) 02:30-04:15 ReSch	
	C-307	Calculus (AI-B)	AP (AI-B)	PF (AI-B)	Calculus (AI-A)	OS (AI-J)	
	C-308	AP (CY-B)	PF (CY-B)	Calculus (CY-B)	AP (CY-A)	Islamic (A)	
	C-309	AP (AI-A)	PF (AI-A)	Stat & Modeling (CS-F/G)	Islamic (CS-E) 01:15-03:00	Islamic (CS-F) 03:05-04:50	
	C-310	Func Eng (CS-G) 08:30-10:15		Data St (CS-H)	Data St (CS-C)	S/w Re-Engg (SE-R)	
	C-311	Discrete (CS-B)	Discrete (CS-A)	COAL (CS-A)	COAL (CS-B)	LA (CS-A) 03:00-04:20	
	C-401	PF (CY-A)	Calculus (CY-A)	LA (CS-J)	LA (CS-K)	PPIT (CS-A)	Info Sec (CS-A)
	C-402	COAL (CS-D)	LA (CS-D)	Data St (CS-D)	Cloud Comp (SE-A)	Info Sec (CS-B)	PPIT (CS-B)
	C-403	Data St (CS-E)	COAL (CS-E)	Discrete (CS-E)	LA (SE-E)	PPIT (CS-C)	Info Sec (CS-C)
	C-404	Ideology of Pak (DS-C) 08:30-10:15		Fund of SE (CY-C)	S/w Req Engg (SE-C) ReSch	OOP (CS-A, 22)	OOP (CS-B, 22)
	C-405	Data St (SE-A)	Data St (CS-F)	DLD (CY-D)	Fund of SE (CY-D)	DLD (CY-C)	
	C-406	LA (SE-F)	LA (SE-G)	HCI (SE-A)	S/w Req Engg (SE-A)	Fund of Mgt (SE-A)	
	C-407	SE	Data St (SE-B)	S/w Req Engg (SE-B)	HCI (SE-B)	Mktg Mgt (CS-C)	Mktg Mgt (SE-C)
	C-408	HCI (SE-C)	S/w Req Engg (SE-C)	Data St (SE-C)	Data St (SE-D)	Freelancing (CS-C)	
	C-409	S/w Req Engg (SE-D)	HCI (SE-D)	TBW (CS-B/Z)	Automata (CS-D)	OS (CS-A, 21)	OS (CS-B, 21)
	C-410	Comp Net (CS-E)	SDA (CS-E)	Automata (CS-C)	SDA (CS-A)	PPIT (DS-N)	DB (CS-D, 21)
	B-130	SDA (CS-C)	Data St (SE-F) ReSch	Comp Net (CS-A/Y)			Deep Learn (DS-N)

Welcome | Monday | Tuesday | Wednesday | Thursday | Friday

(a) index - index number

(b) day - the day you are targeting

(c) room - room or lab name like C-305/Margalla-I

(d) time - class/lab time

(e) course - course/lab name

(f) type - theory/lab

Targeted day from Timetable: Monday from 8:30 AM to 8:05 PM.

Your output should look like this having all the classes mentioned in a timetable for the targeted day in a single dataframe.

	Day	Time	Course	Section	Type	Room
0	Monday	8:30-10:15	Func Eng	CS-A	Theory	C-301
1	Monday	11:30-12:15	PF	CS-A	Theory	C-301
2	Monday	01:00-02:20	AP	CS-A	Theory	C-301
3	Monday	02:30-03:50	Calculus	CS-A	Theory	C-301
4	Monday	05:20-06:40	Adv OS	-	Theory	C-301
5	Monday	06:45-08:05	Adv OS	-	Theory	C-301
6	Monday	08:30-11:15	PF	DS-A	Lab	C-Margala 1

Bonus point: Add an additional column that specifies the degree program as well like BS CS (2023) or BS AI (2020) (Hint: use color coding).

Happy Coding :)