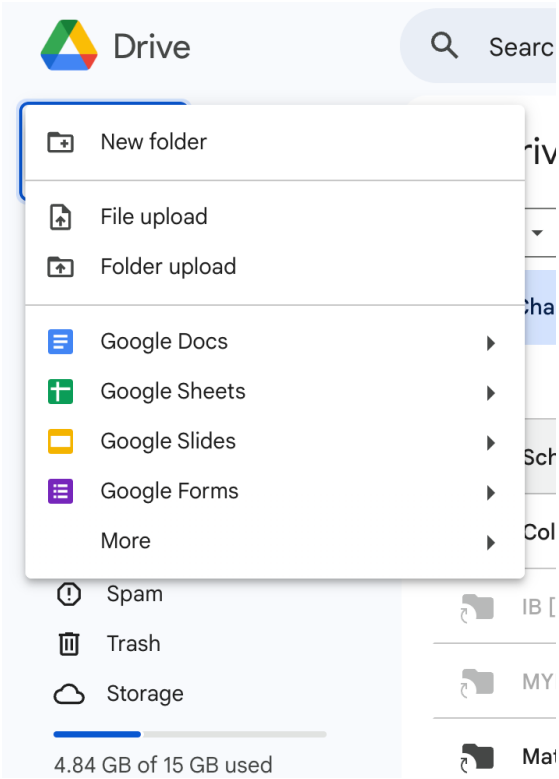
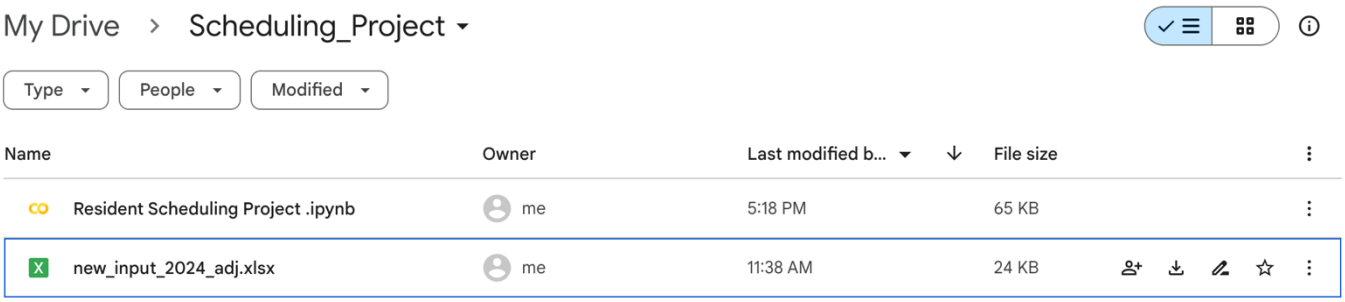
Manual

1. Create folder in GGdrive by clicking "+ New ⇒ New Folder", e.g., Scheduling_Project



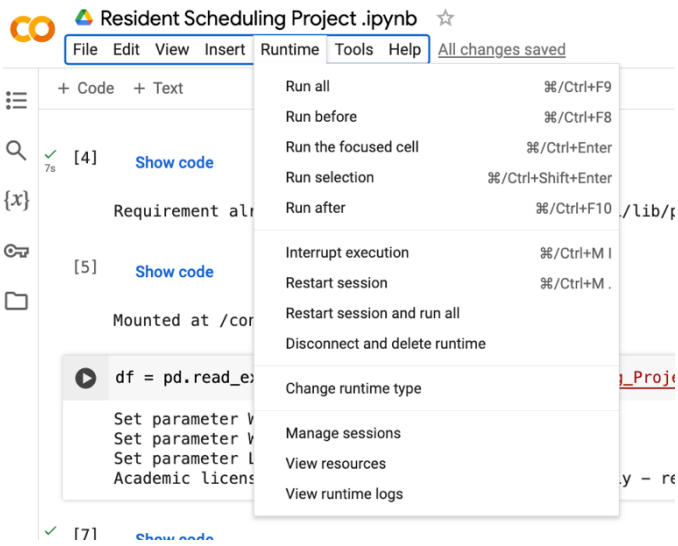
2. Put .ipynb file and .xlsx file in the same folder, e.g., put Resident Scheduling Project .ipynb and new_input_2024_adj.xlsx in Scheduling_Project. Open the .ipynb file.



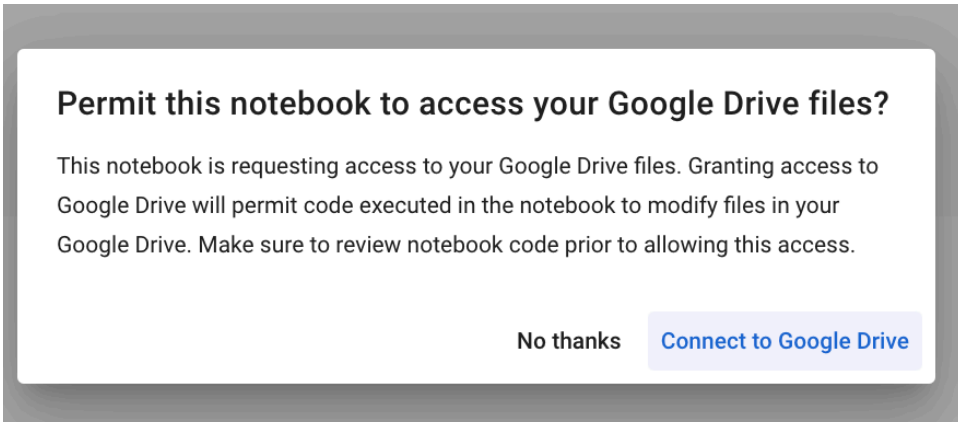
3. Before running the file, you need to set directory of .xlsx file by adjusting this below command line in .ipynb file. For example, if GGdrive folder is Scheduling_Project and excel file name is new_input_2024_adj.xlsx. You have to set directory like this:

```
df =
pd.read_excel("/content/drive/MyDrive/Scheduling_Project/new_input_2024_adj.xlsx", sheet_name = None)
```

4. From menu bar, click "Runtime ⇒ Run all"

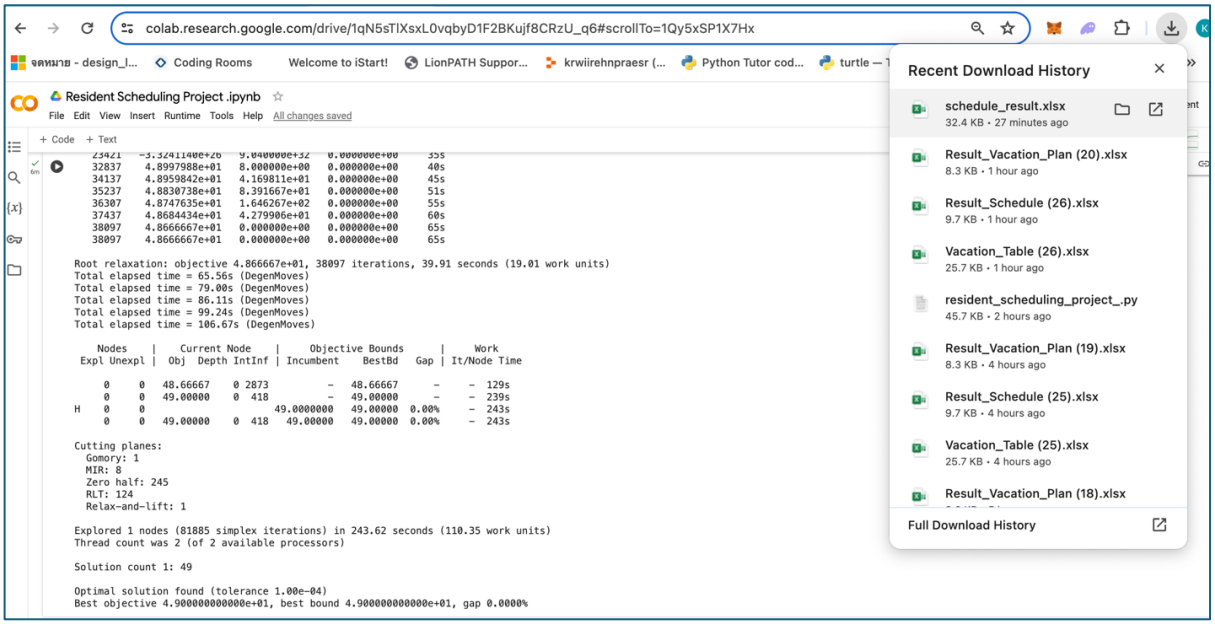


5. After running, the below window will show for the first time of run. Click "Connect to GG Drive" and sign into your GG Drive



6. It will take sometimes to run and if it can find the result, it will show “optimal solution found” in notebook as well as popping the result file in download as shown below:

```
Explored 1 nodes (81885 simplex iterations) in 243.62 seconds (110.35 work units)
Thread count was 2 (of 2 available processors)

Solution count 1: 49

Optimal solution found (tolerance 1.00e-04)
Best objective 4.900000000000e+01, best bound 4.900000000000e+01, gap 0.0000%
```



7. On the other hand, if the input cause infeasibility, it will show below. Anyway, if the algorithm run for too long (over 30 mins), it is safe to say that the input is infeasible

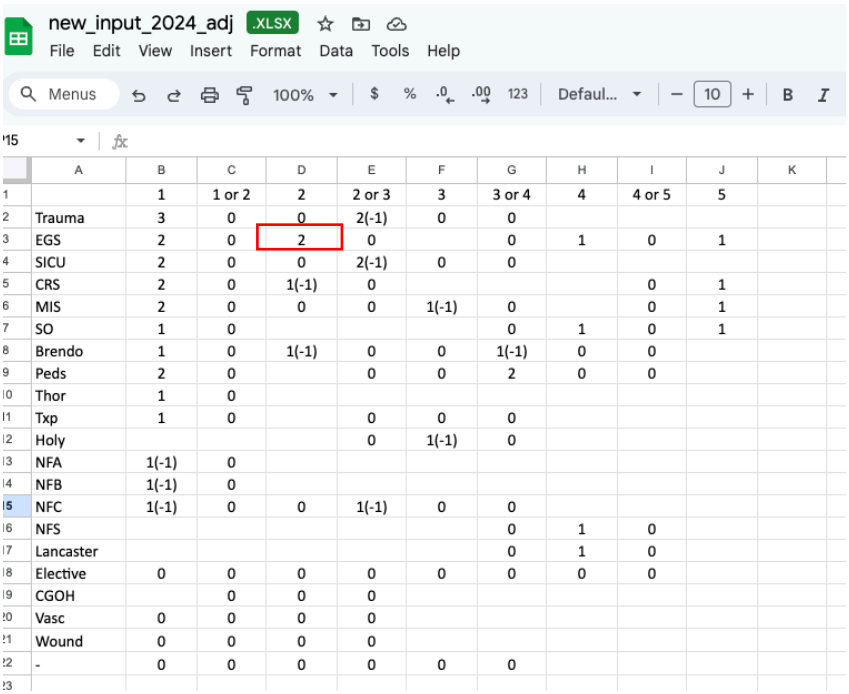
```
Root relaxation: infeasible, 828258 iterations, 3637.55 seconds (2032.75 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0 infeasible    0               - infeasible      -     - 3668s

Explored 1 nodes (828258 simplex iterations) in 3668.79 seconds (2042.66 work units)
Thread count was 2 (of 2 available processors)

Solution count 0

Model is infeasible
Best objective -, best bound -, gap -
```

Model is infeasible

8. To try fixing infeasibility, you have to adjust input file located in the folder. After adjusting, please remember to make sure what you update is saved (ctrl + s). Then, close input file , reopen again, go back to notebook. Then, click “Runtime ⇒ Restart session and run all ”

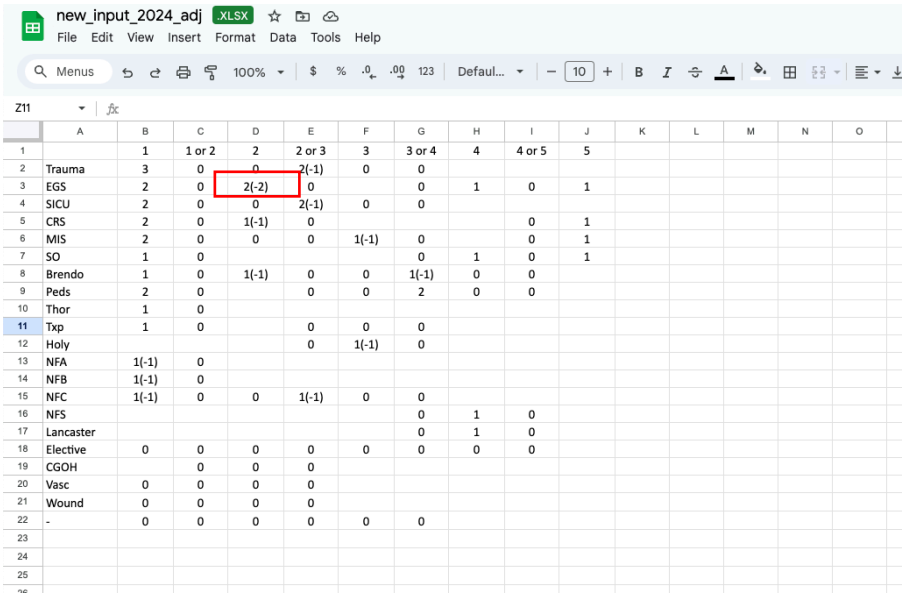
Examples :

1. This input cause infeasibility. Say I want to adjust value in the red block



	A	B	C	D	E	F	G	H	I	J	K
1		1	1 or 2	2	2 or 3	3	3 or 4	4	4 or 5	5	
2	Trauma	3	0	0	2(-1)	0	0				
3	EGS	2	0	2	0		0	1	0	1	
4	SICU	2	0	0	2(-1)	0	0				
5	CRS	2	0	1(-1)	0				0	1	
6	MIS	2	0	0	0	1(-1)	0		0	1	
7	SO	1	0				0	1	0	1	
8	Brendo	1	0	1(-1)	0	0	1(-1)	0	0		
9	Peds	2	0		0	0	2	0	0		
10	Thor	1	0								
11	Txp	1	0		0	0	0				
12	Holy				0	1(-1)	0				
13	NFA	1(-1)	0								
14	NFB	1(-1)	0								
15	NFC	1(-1)	0	0	1(-1)	0	0				
16	NFS						0	1	0		
17	Lancaster						0	1	0		
18	Elective	0	0	0	0	0	0	0	0		
19	CGOH		0	0	0						
20	Vasc	0	0	0	0						
21	Wound	0	0	0	0						
22	-	0	0	0	0	0	0				
23											

2. I adjust to 2(-2). Then, I save using ctrl +s ⇒ close input file⇒ reopen input file



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		1	1 or 2	2	2 or 3	3	3 or 4	4	4 or 5	5					
2	Trauma	3	0	0	2(-1)	0	0								
3	EGS	2	0	2(-2)	0		0	1	0	1					
4	SICU	2	0	0	2(-1)	0	0								
5	CRS	2	0	1(-1)	0				0	1					
6	MIS	2	0	0	0	1(-1)	0		0	1					
7	SO	1	0				0	1	0	1					
8	Brendo	1	0	1(-1)	0	0	1(-1)	0	0						
9	Peds	2	0		0	0	2	0	0						
10	Thor	1	0												
11	Txp	1	0		0	0	0								
12	Holy				0	1(-1)	0								
13	NFA	1(-1)	0												
14	NFB	1(-1)	0												
15	NFC	1(-1)	0	0	1(-1)	0	0								
16	NFS						0	1	0						
17	Lancaster						0	1	0						
18	Elective	0	0	0	0	0	0	0	0						
19	CGOH		0	0	0										
20	Vasc	0	0	0	0										
21	Wound	0	0	0	0										
22	-	0	0	0	0	0	0								
23															
24															
25															

3. Go back to notebook and click “Runtime ⇒ Restart session and run all ”