CS230 HW6

1. legal periodic temporal schedule:

Time	π1	π2	π3	π4	π5
Time Slice 1	1	2	1	1	2
Time Slice 2	1	3	5	3	2
Time Slice 3	3	4	5	5	3
Time Slice 4	5	5			5
Time Slice 5	6				5
Time Slice 6					6

Fig1: Periodic Temporal Schedule:

Explanation why your proposed temporal schedule is legal:

- In the above periodic schedule we can put the **constraint** that in each time slice, we will s**chedule the trailing VP of a job so that**, no VP of a particular job will be ahead by it's sibling VPs (remaining VPs of the same job) by more than one time slice.
- **For example**, in figure 1 in the **first slice, we will execute the first three VPs - VP1, VP2 and VP3 of job1**. In the **second time slice**, we will pick up the **trailing VP i.e. VP4 (instead of VP1, VP2 or VP3) of job1**. In doing so we ensure that no VP of a particular job will be ahead of its sibling VPs by more than one time slice. We will follow this constraint for every job. **Hence, our temporal schedule is legal.**

Give the number of cycles in its period:

- We can see in figure1, that each Job completes **one complete execution in 6 time slices**. Hence, the number of cycles in its period is **6.**

Compute the schedule's idling ratio:

- Idling ratio for the scheduler in figure1 = (no. of empty slots) / (total no. of slots)
  = **9/30 = 3/10 = 0.3**

2. new schedule (new or a modification of the given schedule) that has a better idling ratio

				5
5	5	6	6	5
3	4	5	5	3
1	3	5	3	2
1	2	1	1	2
π1	**π2**	**π3**	**π4**	**π5**

Fig2: New Spatial scheduler

Explanation:

- We can modify the spatial scheduler given the question and make a new scheduler as shown in figure2.
- We see that it will have a cycle of 5 since all jobs will be executed once in 5 cycles.
- **Idling ratio** for new scheduler = (no. of empty slots) / (total no. of slots) = **4 / 25 = 0.16**, which is **better compared to the idling ratio of 0.3 found in question1.**

3. Is there a best periodic temporal schedule i.e a temporal schedule with a minimum idling ratio?

- Yes, we can achieve an idling ratio of 0. Below is one of the temporal scheduler examples which achieves 0 idling ratio.

Time	**π1**	**π2**	**π3**	**π4**	**π5**
Time Slice 1	1	2	1	1	2
Time Slice 2	1	3	5	3	2
Time Slice 3	3	4	5	5	3
Time Slice 4	5	5	6	6	5
Time Slice 5	5	**1**	**1**	**1**	**1**

Fig3: periodic temporal scheduler with 0 idling ratio

- Using the periodic temporal scheduler as mentioned in figure3, we see that **Job1 gets executed twice in a period of 5 cycles**. (**total 8 VPs** of job1 **executed** as seen on figure3 and **Job1 has 4 VPs**)
- **Other Jobs get executed exactly once** in a period of 5 cycles.
- We can see the periodic temporal scheduler mentioned in figure3 has **0 empty slots in a period of 5 cycles**. Hence, **it's idling ratio = 0 (no. of empty slots / total no. of slots = 0 / 25).**