TK1 Exercise 10

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Task 1 : Maekawa's Voting Algorithm

Voting sets:
V1: (1,2,3,4,7)
V2: (1,2,3,5,8)
V3: (1,2,3,6)
V4: (1,4,5,6,7)
V5: (2,4,5,6,8)
V6: (3,4,5,6)
V7: (2,4,7,8)
V8: (1,5,7,8)

a. Yes. The algorithm of Meakawa's will work in this case.
   Since it satisfies the model :
   - Each process available in at least one voting group. **($p_i \in V_i$)**
   - All voting groups (voting sets) contain at least one process member that is also represented in another group. Means that they build are able to vote with each other. **($V_i \cap V_k \neq \varnothing$)**

b. The two specific fairness conditions of Maekawa's algorithm :
   i. Every voting set has same size - equal effort **($|V_i| = K$)**
   ii. Every process has the same frequency (member of same number of voting sets) - equal responsibility.

   No. Both conditions do not hold in this case. As we illustrate this example in the table below:

Voting sets	1	2	3	4	5	6	7	8	Number of members in set
V1	y	y	y	y			y		5
V2	y	y	y		y			y	5
V3	y	y	y			y			4

V4	y			y	y	y	y		5
V5		y		y	y	y		y	5
V6			y	y	y	y			4
V7		y		y			y	y	4
V8	y				y		y	y	4
Repeats	5	5	4	5	5	4	4	4	

c. Yes! In this case, we can add processes with lower frequency to voting groups that have smaller set size to balance the sizes of sets and the frequencies of some processors.

- From the table above, less frequent processes are : **3, 6**,7,8
- Voting sets with fewer members are : V3, V6, V7, V8

We do the following adjustments to these voting sets as follows :

V3 = {1, 2, 3, 6, **7**}
V6 = {3, 4, 5, 6, **8**}
V7 = {2, **3**, 4, 7, 8}
V8 = {1, 5, **6**, 7, 8}

Now, each process is in 5 voting sets and each voting set has 5 processes.