



# **Additional Exercises**



Q1: “*Plurality voting is NOT a good approach to select among four candidates*”.


If you think it is true, explain the statement.

Otherwise, give a counterexample to show that the statement is false.



Answer:

Yes, because it may happen that no candidate obtains a majority of the vote such that there is no winner using plurality voting.



Q2: A class of 18 CPT302 students uses the Borda count method (starting with 0) to select one of four candidates: Adam, Bobby, Chuck or David. If Adam receives 35 Borda counts, Bobby receives 28 Borda counts, and Chuck receives 20 Borda counts, how many Borda counts does David receive? Who wins this Borda election?

➡ Note that you are required to include the relevant steps in your answers to show all your work.

# Answer:

Example of combinations

1'	2'	3'			.	.	.					.	.	.			18'
a	a	a			.	.	.	a				.	.	.			d
b	c	b			.	.	.	b				.	.	.			c
c	b	d			.	.	.	d				.	.	.			b
d	d	c			.	.	.	c				.	.	.			a

- ➡ Total combinations for choosing candidates = 18.
- ➡ There are 10 points (3+2+1+0) for each combination.
- ➡ There are totally  $18 \times 6 = 108$  Borda points.
- ➡ Then David receives the Borda points =  $108 - 35 - 28 - 20 = 25$ .
- ➡ Thus Adam is the winner.

- Q3: There are 6 PhD students are for the best Teaching Assistant (TA) of the year award. The decision is made by 100 module leaders using the plurality method. After the first 60 votes have been cast, the situation is as follows:

	votes
Peter	22
Maria	3
Owen	6
Nic	11
Tina	0
Diana	18

What is the minimal numbers of the remaining votes Peter needs to be guaranteed to win? Note that you are required to include the relevant steps in your answers to show all your work.



## Answer:

- $p$  denotes the number of votes Peter needs to make sure at least a tie with Diana for first place.
- Then  $p+22=18+(40-p)$  and  $p=18$ .
- So, if Peter gets  $18+1=19$  votes from the remaining 40 to guarantee that Peter will be the best TA.