

TOPIC: FAIRNESS CRITERION

Majority Criterion

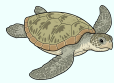
◆ **Fairness criteria** are conditions that voting methods *ideally* should uphold to be considered fair.

► **Majority Criterion:** If a candidate receives the majority of _____ votes, then they should win.

EXAMPLE

The 41 employees at a marine biology museum are voting on a new mascot. The choices are a sea turtle, whale, fish and dolphin. Use the Borda count method to determine the winner. Is the majority criterion satisfied?

Number of Voters	15	12	9	4	1
1st	T	D	D	T	T
2nd	W	T	T	F	W
3rd	F	W	F	W	D
4th	D	F	W	D	F



T:



W:



F:



D:

Winner:

Majority:

Is the Majority Criterion Satisfied? [Yes | No]

◆ The only voting method that *can* violate the majority criterion is _____.

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EXAMPLE

Which of the four voting methods cannot violate the majority criterion? Select all that apply.

[PLURALITY | BORDA COUNT | PLURALITY WITH ELIMINATION | PAIRWISE COMPARISON]

EXAMPLE

Below is a preference table for a student council election with candidates: Alexei, Brady, Charleena, and Deirdre. Use the results to answer the questions below.

Number of Voters	15	10	9	5	1
1st	A	D	D	A	B
2nd	D	B	C	D	D
3rd	B	C	B	C	C
4th	C	A	A	B	A

(A) Using the Borda count method, who wins the election?

(B) Does the result of this election violate the majority criterion?

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Head-to-Heat (Condorcet) Criterion

◆ **Head-to-Head Criterion:** If a candidate beats every other candidate in a head-to-head vote, then they should win.

EXAMPLE

A preschool class is voting on their favorite animal between the following choices: koala, giraffe, and lion. Use the results in the preference table below to determine the winner using the plurality method. Does this satisfy the head-to-head criterion?

Number of Voters	10	9	7	2
1st	K	L	G	K
2nd	L	G	L	G
3rd	G	K	K	L



Winner by Plurality:

Pairs: Koala vs. Giraffe

Koala vs. Lion:

Giraffe vs. Lion:

Is the Head-to-Head Criterion Satisfied? [Yes | No]

◆ The only voting method that *cannot* violate the majority criterion is _____.

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EXAMPLE

Below is a preference table for a student council election with candidates: Alexei, Brady, Charleena, and Deirdre. Use the results to answer the questions below.

Number of Voters	15	10	9	5	1
1st	A	D	D	A	B
2nd	D	B	C	D	D
3rd	B	C	B	C	C
4th	C	A	A	B	A

(A) Using the Borda count method, who wins the election?

(B) Do the results of this election violate the head-to-head criterion?

EXAMPLE

Below is a preference table for a committee election with candidates Prudence, Rick, Simone, and Tino. Use the table to answer the questions below.

Number of Voters	15	10	9	5	1
1st	T	R	S	S	P
2nd	P	P	P	P	T
3rd	S	T	R	T	S
4th	R	S	T	R	R

(A) Using the plurality-with-elimination method, who wins the election?

(B) Do the results of this election violate the head-to-head criterion?