Voting Systems Criteria

1) The **monotonicity criterion** is a voting system criterion used to evaluate both single and multiple winner ranked voting systems. A ranked voting system is **monotonic** if it is neither possible to prevent the election of a candidate by ranking them higher on some of the ballots, nor possible to elect an otherwise unelected candidate by ranking them lower on some of the ballots (while nothing else is altered on any ballot).
https://en.wikipedia.org/wiki/Monotonicity_criterion

2) The Condorcet loser criterion: If there is a candidate who loses in a one to one comparison to each of the other candidates, then that candidate should not be the winner of the election. (This fairness criterion is a sort of mirror image of the regular Condorcet criterion)

3) *strong Pareto*: If at least one voter ranks alternative *y* over alternative *x* and no voters rank *x* over *y*, then *x* must not be elected.

4) *anonymity*: Every voter must be treated equally.
neutrality: Every alternative must be treated equally.

5) *Condorcet-consistency*: If an alternative, say *x*, is such that for each other alternative, say *y*, some majority of the voters rank *x* over *y*, then *x* must be elected.

6) *independence of irrelevant alternatives* (*IIA*, the weak version for social choice procedures): The winner must not change if voters raise or lower non-nominated alternatives in their votes. (See "Arrow's Impossibility Theorem." Also see below for the strong version for social ordering procedures, which has the same name *IIA* in the literature of social choice theory.)

7) *independence of clone alternatives* (*ICA*, promoted by TN Tideman): If there is a subset of the nominated alternatives such that no voter ranks any alternative outside the subset between any alternatives in the subset, then the subset is called a "set of clones." The election odds of every alternative that's not one of the clones must not change if a strict subset of the clones is deleted from both the votes and the set of nominees.

8) *local independence of irrelevant alternatives* (*LIIA*): If the order of finish ranks some subset of alternatives together (in other words, no alternative outside the subset finishes between any in the subset) then the relative order of finish of the alternatives within this subset must not change if all other alternatives are deleted from the votes and from the set of

nominees. (This criterion is promoted by Peyton Young.)

http://alumnus.caltech.edu/~seppley/

9) Smith Criterion:

1.X is socially-preferred to Y if the number of people who prefer X to Y is greater than the number of people who prefer Y to X.

2.The Smith set is the smallest set of candidates such that every candidate in the set is socially-preferred to every candidate outside the set.

3.If everyone votes sincerely, then the winner should come from the Smith set.

https://democracychronicles.com/ideal-majoritarian-conditions/

Voting Fairness Criteria Handout

10) **The Majority Criterion**: An election violates the Majority Criterion if some candidate has a majority of the first place votes but loses the election.

Example: Our system of voting for president can violate the Majority Criterion (since having a majority of the popular vote does not mean having a majority of the electoral college vote and thus does not guarantee being the winner. In fact, in the 1876 presidential election, Samuel Tilden had 51% of the popular vote but lost to Rutherford B. Hayes.)

Note: In the 2000 presidential election, Gore had only a plurality with 48.4% versus Bush at 47.9% and Nader at 2.7% of the popular vote, so the Bush-Gore election did not violate the Majority Criterion. In order for the Majority Criterion to be violated, there must have been a candidate with a majority. Regardless of who wins, an election in which no one has a majority never violates the Majority Criterion.

http://www.math.unl.edu/~bharbourne1/M203JSpr09/VotingFairnessHandout.pdf

11) The **majority loser criterion** is a criterion to evaluate single-winner voting systems. The criterion states that if a majority of voters prefers every other candidate over a given candidate, then that candidate must not win.

https://en.wikipedia.org/wiki/Majority_loser_criterion

12) The **mutual majority criterion** is a criterion used to compare voting systems. It is also known as the **majority criterion for solid coalitions** and the **generalized majority criterion**. The criterion states that if there is a subset S of the candidates, such that more than half of the voters strictly prefer every member of S to every candidate outside of S, this majority voting sincerely, the winner must come from S. This is similar to but stricter than the majority criterion, where the requirement applies only to the case that *S* contains a single candidate.

https://en.wikipedia.org/wiki/Mutual_majority_criterion

http://www.votingmatters.org.uk/issue17/i17p3.pdf

V·T·E **Comparison of voting systems** [hide]

	Monotonic	Condorcet	Majority	Condorcet loser	Majority loser	Mutual majority	Smith	ISDA	LIIA	Clone independence	Reversal symmetry	Polynomial time	Participation, Consistency	Resolvability
Schulze	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Ranked pairs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Copeland	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No
Kemeny-Young	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
Nanson	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes
Baldwin	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	No	Yes
Instant-runoff voting	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No	Yes
Borda	Yes	No	No	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes
Bucklin	Yes	No	Yes	No	Yes	Yes	No	No	No	No	No	Yes	No	Yes
Coombs	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	No	Yes
MiniMax	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes
Plurality	Yes	No	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes
Anti-plurality	Yes	No	No	No	Yes	No	No	No	No	No	No	Yes	Yes	Yes
Contingent voting	No	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	No	Yes
Sri Lankan contingent voting	No	No	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes
Supplementary														

https://en.wikipedia.org/wiki/Schulze_method