DISCRETE MATH

▷ Test 1 // Review B *aka study guide*

N:

D:

P: 1 2 3 4 5 6

What is on the TEST?

1. Problems from Quiz 1 and Quiz 2, which is basically Sections A-E.
2. Problems from Sections F (41-42 + 45-46) + G (51-56, 59-60)
3. Things from the Lessons, like below...and more?

Conclusion (4 major ideas were? - check lesson 5)

1. **Elections are more than just for president and governors. It is for deciding where to eat, getting a job, etc.**
2. **There are many different methods to vote**
3. **Outcomes can change with different voting strategies**
4. **Elections should be fair.**

Formulas (check lesson 4)

1) Sum of Consecutive Integers Formula

$$1 + 2 + 3 + \ldots + L = \frac{L(L+1)}{2}$$

"L" is # adding up to →

2) Number of Pairwise Comparisons

"N" is the number of candidates →

$$\frac{(N-1)N}{2}$$

4 Fairness Criterions (know them-memorize)

Majority Criterion: **A majority candidate should always win the election**

Condorcet Criterion: **A Condorcet Candidate (winner of head-to-head) should always win the election.**

Monotonicity Criterion: **If candidate X wins an election, then a second election where that candidate gains votes should still win the election.**

Independence of Irrelevant Alternatives (IIA): **If candidate X wins an election, then a second election where a candidate exits or irrelevant candidates enters the race, then Candidate X should still win.**

Arrow's Impossibility Theorem

It is mathematically impossible for a democratic voting method to satisfy all of the fairness criteria.

Violations (memorize)

Plurality violates: **Condorcet and IIA Criterions**

Borda Count violates: **Majority, Condorcet and IIA Criterions**

Plurality w/ Elimination violates: **Condorcet, Monotonocity, and IIA Criterion**

Pairwise Comparisons violates: **IIA Criterion**