

# Math 1332: Worksheet 2

September 8, 2021

Name: \_\_\_\_\_

1. A movie club is voting on what film to see next, among the options of Dune (D), No Time to Die (NT), and Shang-Chi (SC). The club members have the following preferences:

	Alice	Barbara	Carlos	David	Eric	Fred	Grace	Holly	Ivan	James	Kaitlyn
1st choice	SC	NT	D	NT	NT	SC	SC	D	SC	NT	NT
2nd choice	D	D	SC	SC	D	D	D	SC	D	D	D
3rd choice	NT	SC	NT	D	SC	NT	NT	NT	NT	SC	SC

- (a) What is the plurality vote winner? Is this choice also a majority vote winner?
- (b) What choice, if any, is the Condorcet winner?
- (c) Suppose the club uses instant runoff voting as their method to decide the vote. Which option would they pick?
- (d) Do these three different methods give the same choice for which movie to see? What implication, if any, does your answer have on whether these methods produce a fair outcome?

2. Consider the same situation from the previous question, except that some club members changed their votes to switch their preference for Dune versus Shang-Chi (changes are in bold):

	Alice	Barbara	Carlos	David	Eric	Fred	Grace	Holly	Ivan	James	Kaitlyn
1st choice	SC	NT	<b>SC</b>	NT	NT	SC	SC	<b>D</b>	SC	NT	NT
2nd choice	D	<b>SC</b>	<b>D</b>	SC	D	D	D	<b>SC</b>	D	<b>SC</b>	<b>SC</b>
3rd choice	NT	<b>D</b>	NT	D	SC	NT	NT	NT	NT	<b>D</b>	<b>D</b>

- Using these new votes, determine the plurality winner.
- Also determine the Condorcet winner, if any.
- And determine the winner using the IRV method.
- Which methods, if any, give a different answer after the change in votes? For each method, is it reflective of a fairness or unfairness in the method that it did/did not change the outcome in this circumstance? Explain why you think so.