

Math 1015: Homework #5

Question 1. Find the results of this approval election:

	3	2	2	1	1
A	X			X	X
B	X	X			X
C		X	X		
D		X	X		

Question 2. Consider this election:

	3	5	2
A	B	D	
C	A	A	
B	D	C	
D	C	B	

- a) Let's imagine we run this election instead using approval voting, and assume that each voter will approve of their top two choices, but disapprove of their bottom two choices.

Make a chart (like in the previous question) that summarizes the approval ballots, and find the winner using approval voting.

- b) For the same election, if we do the random dictator method, say what the probability is in percentages for each candidate to win. Your answer should say something like: "A wins with probability ???%, B wins with probability ???%, etc."

Question 3. Invent and describe a situation where it might be a good idea to use the random dictator method, and also a situation where it would be a bad idea to use the random dictator method.

Question 4. Now that we're done talking about ranked voting systems, think a bit about which ones you like and don't like for use in real-world politics. Write a few sentences about what system you personally think would work the best in real life. It's OK if your answer is something like "I'm not sure, but I think xxxxx is pretty good and probably xxxxx is not very good." Don't just tell me your opinions, say a bit about why you feel the way that you do.

You don't need to agree with any opinions that I personally have said in class— your grade on this question will just be based on how well you explain yourself and demonstrate that you've thought about it carefully.

Question 5. In the weighted system $[12 : 8, 7, 1]$, explain in words why the 8 & 7 have the same amount of power even though 8 is more than 7.

Question 6. Consider this weighted voting system: $[18 : 6, 4, 4, 3, 2, 1]$. In each part, briefly explain (don't just say "yes" or "no"):

- a) Are there any dictators?
 b) Are there any voters with veto power?

c) Are there any dummies?

Question 7. In each part, invent a different example of a weighted system (like $[?:?????]$) having:

- a) a dictator
- b) someone with veto power who is not a dictator
- c) more than one voter with veto power
- d) a voter with veto power, and at least one dummy

Question 8. Compute the Shapley-Shubik power index for $[15 : 10, 7, 3]$.

Question 9. Compute the Shapley-Shubik power index for $[12 : 8, 8, 4]$.