

PROBLEM SET #4

Due Thursday, April 14 @ 11:59 pm
Submit as single pdf file to onCourse

Remember to review the Guidelines for Problem Sets on the course webpage.

1. For a given profile, let q_0 denote the plurality point and q_1 the antiplurality point in the representation simplex.

(a) In each case, create a profile with these outcomes or explain why it is impossible. If the profile exists, briefly explain your thought process for creating the example.

i. $q_0 = \left(\frac{1}{4}, \frac{5}{12}, \frac{1}{3}\right)$ $q_1 = \left(\frac{3}{8}, \frac{1}{4}, \frac{3}{8}\right)$

ii. $q_0 = \left(\frac{1}{32}, \frac{2}{3}, \frac{29}{96}\right)$ $q_1 = \left(\frac{1}{5}, \frac{8}{15}, \frac{4}{15}\right)$

(b) For each profile that you determined was possible in (a), give all possible outcomes for this profile (including ties) using a weighted method.

2. Consider the profile

10	$A > B > C$	7	$C > B > A$
7	$A > C > B$	9	$B > C > A$
7	$C > A > B$	7	$B > A > C$

(a) Find the decomposition of this profile in terms of $K, C_y, R_1, R_2, B_1, B_2$.

(b) Determine the point in pairwise space corresponding to the profile.

(c) Determine the point on the transitivity plane corresponding to the profile.

(d) Explain how your results show that the Borda Count and pairwise outcomes for this profile differ.

3. Create examples of profiles with three candidates that have the following properties, or explain why no such profile exists.

Explain how you constructed the profile – Guess and check is *not* ok.

(a) the Borda Count gives $B > C > A$ and the pairwise outcome is $C > B > A$

(b) C is the Condorcet winner and the Borda count gives $A > B > C$

4. Consider the following three candidate profile

26	$A > B > C$
25	$C > A > B$
49	$B > C > A$

(a) Compute the winner using plurality with runoff.

(b) Suppose that 47 of the voters with the preference $B > C > A$ decide to stay home and not vote. Recompute the winner using plurality with runoff.

(c) Compare the outcomes from the previous two parts from the perspective of the 47 voters in part (b). Why is this result disturbing?