

KEY

Packet p 708

Day 3: Quiz Review 1.1-1.5

1. A basketball ranking poll is trying to rank the top teams in the nation. The leading contenders are: Villanova (V), Illinois (I), UConn (C), or Duke (D). The preference ballots are organized in the following preference schedule.

NUMBER OF VOTERS	13	11	4	11	7
1ST CHOICE	V X	I	D/	C	C
2ND CHOICE	I	V X	I	I	D/
3RD CHOICE	D/	D/	V X	V X	I
4TH CHOICE	C	C	C	D/	V X

a). How many votes were cast? 46

b). How many votes would be needed for there to be a majority winner? 24 (23 is exactly half... majority winner requires over half)

Is there a majority winner? no If so, who is it? -

c). Find the winner by the plurality method. UConn

d). Find the winner by the 4-3-2-1 Borda Count Method. Illinois

POINT TOTAL FOR V: 122
 POINT TOTAL FOR I: 142
 POINT TOTAL FOR C: 109
 POINT TOTAL FOR D: 96

V: $4(13) + 3(11) + 2(4) + 2(11) + 1(7)$
 I: $3(13) + 4(11) + 3(4) + 3(11) + 2(7)$
 C: $1(13) + 1(11) + 1(4) + 4(11) + 4(7)$
 D: $2(13) + 2(11) + 4(4) + 1(11) + 2(7)$

e). Find the winner by the runoff method. Villanova

f). Find the winner by the sequential runoff method. Illinois

g). Find the winner by the Condorcet method. Illinois

	V	I	C	D
V	X	I	V	V
I	X	X	I	I
C	X	X	X	D
D	X	X	X	X

for Condorcet. winner. must win head-to-head versus everyone else

2. Suppose that this election is conducted by the approval method instead and that each voter approves of the choices marked on the chart below.

VOTERS	A	B	C	D	E	G	H	I	J	K
Villanova	X		X			X		X		
Illinois	X	X		X		X	X			X
U Conn	X		X		X			X		
Duke	X		X	X	X		X	X	X	X

a) Determine the approval winner. Duke

b) If any team with 50% or more of the votes can be selected and they will have a run off, which teams would be in this run-off?

Duke + Illinois
 (8 votes) of 10 (6 votes) of 10

3. How many possible preference schedules are there if there are 7 choices to choose from in an election? $7! = \boxed{5040}$

4. Name and describe each of Arrow's Conditions.

- ① Non-dictatorship: The preference of a single individual should not become the group ranking without considering the preferences of others
- ② Individual Sovereignty: Each individual should be able to rank choices how they want - and to indicate ties
- ③ Unanimity: If everyone prefers one choice, the group ranking should reflect that preference
- ④ Freedom from Irrelevant Alternatives: The winning choice should still win if one choice - the irrelevant alternative - is removed
- ⑤ Uniqueness of Group Ranking: The method of producing the group ranking should give the same result each time (it should be repeatable)

5. Consider the weighted voting situation in which voters A, B, C, & D have 11, 8, 6, & 2 votes, respectively, and 14 votes are needed to pass an issue.

a) Is the coalition formed by A and C a winning coalition? Yes

$$\{A, C; 17\}$$

11+6

This A and C coalition has 17 votes, which is above the amount (14) to pass.

b) Which players are essential in the coalition {A, B, C, D; 27}? none

taking 11, 8, 6, or 2 votes away from the coalition still leaves enough votes (≥ 14) needed to pass

c) List all the winning coalitions (USE CORRECT NOTATION - see question above).

- $\{A, B; 19\}$, $\{A, C; 17\}$, $\{B, C; 14\}$
 $\{A, B, C; 25\}$, $\{A, B, D; 21\}$, $\{A, C, D; 19\}$, $\{B, C, D; 16\}$
 $\{A, B, C, D; 27\}$

d) Find the Power index for each voter.

A: IIII
B: IIII

C: IIII
D: 0

A: 4 B: 4 C: 4 D: 0

e) Are there any voters who are dummies or dictators? Explain.

- There are no dictators because no voters are essential in every winning coalition.
- There is a dummy - D - because D is not essential in any winning coalition

f) Do the power indices reflect the distribution of the votes? Explain.

No. The power indices do not reflect the distribution of votes because A, B, and C have the same power index but not the same weight in votes