

MAT 100 Key Homework # 8

①

Lai 460

i. 231

ii. 116 (4 voters $460/4+1$)

iv. $A = 150 \leftarrow A$ wins
 $B = 50$
 $C = 120$
 $D = 140$

A 1st
 B 4th
 C 3rd
 D 2nd

v. $A = 120 \times 1 + 50 \times 2 + 40 \times 3 + 90 \times 4 + 60 \times 4 + 100 \times 2 = 1140 \leftarrow$ Third
 $B = 120 \times 2 + 50 \times 4 + 40 \times 2 + 90 \times 2 + 60 \times 1 + 100 \times 3 = 1060 \leftarrow$ 4th
 $C = 120 \times 4 + 50 \times 3 + 40 \times 1 + 90 \times 3 + 60 \times 2 + 100 \times 1 = 1160 \leftarrow$ 2nd
 $D = 120 \times 3 + 50 \times 1 + 40 \times 4 + 90 \times 1 + 60 \times 3 + 100 \times 4 = 1240 \leftarrow$ D wins

vi. $A \vee B$
 $120 + 50 + 100$

$B \vee C$
 $120 + 90 + 60$

$A \vee C$
 $120 + 50$

$B \vee D$
 $120 + 40 + 60 + 100$

$A \vee D$
 $120 + 40 + 100$

$C \vee D$
 $120 + 50 + 90$

A	B	C	D
	1	111	11
4th	3rd	1st	2nd

C wins

vii. Rnd 1
 $A: 150$
 ~~$B: 50$~~
 $C: 120$
 $D: 140$

Rnd 2
 $A: 150$
 $C: 170$
 ~~$D: 140$~~

Rnd 3
 $A: 290$
 $C: 170$

A wins
 C 2nd B 4th
 D 3rd

viii. Yes, independence of irrelevant alternatives & Condorcet

i. 44
 b. ii. 23

iii. 12 ($44/4+1$)

iv. $A = 18$
 $B = 11$ A wins
 $C = 9$
 $D = 6$

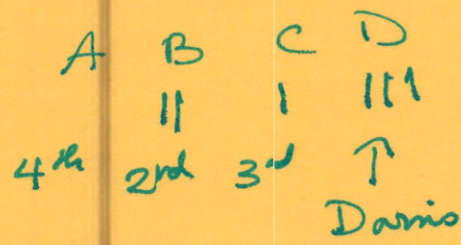
A 1st
 B 2nd
 C 3rd
 D 4th

1b cont'd

$N: A: 18 \times 4 + 11 \times 1 + 9 \times 1 + 6 \times 1 = 98$
 $B: 18 \times 2 + 11 \times 4 + 9 \times 3 + 6 \times 2 = 119 \leftarrow \text{wins}$
 $C: 18 \times 1 + 11 \times 3 + 9 \times 4 + 6 \times 3 = 105$
 $D: 18 \times 3 + 11 \times 2 + 9 \times 2 + 6 \times 4 = 118$

- B 1st
- D 2nd
- C 3rd
- A 4th

Vi. A vs B B vs C
 18 18+11
 A vs C B vs D
 18 18+6
 A vs D C vs D
 18 18+6



vii. Round 1 Round 2 Round 3

A: 18	A: 18	A: 18	A 2 nd
B: 11	B: 11	C: 26 ← wins	B 3 rd
C: 9	C: 15		D 4 th
D: 6			

viii. yes, independence of irrelevant alternatives & Condorcet

- c. i. 21
 ii. 11
 iii. 5

iv. N: 5
 H: 8 ← wins
 B: 3
 F: 5
 S: 0

v. N: $5 \times 5 + 3 \times 2 + 3 \times 2 + 5 \times 3$, $3 \times 4 + 2 \times 4 = 72$ winner
 H: $5 \times 2 + 3 \times 5 + 3 \times 3 + 5 \times 5 + 3 \times 1 + 2 \times 2 = 66$
 B: $5 \times 1 + 3 \times 3 + 3 \times 5 + 5 \times 4 + 3 \times 3 + 2 \times 3 = 64$
 F: $5 \times 3 + 3 \times 4 + 3 \times 1 + 5 \times 2 + 3 \times 3 + 2 \times 5 = 46$
 S: $5 \times 4 + 3 \times 1 + 3 \times 4 + 5 \times 1 + 3 \times 2 + 2 \times 1 = 48$

- N 1st
- 2nd H
- 3rd B
- S 4th
- F 5th