MAT 100 Key Homework # 8

Lai 460

i. 231

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

iii. A = 150 ← A wins
B = 50
C = 120
D = 140.

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

iv. A = 120×1 + 50×2 + 40×3 + 90×4 + 60×4 + 100×2 = 1140 ← Third
B = 120×2 + 50×4 + 40×2 + 90×2 + 60×1 + 100×3 = 1060 ← 4th
C = 120×4 + 50×3 + 40×1 + 90×3 + 60×2 + 100×1 = 1160 ← 2nd
D = 120×3 + 50×1 + 40×4 + 90×1 + 60×3 + 100×4 = 1240 ← D wins

v. A v B
120+50+100

B v C
120+90+60

A v C
120+50

B v D
120+40+60+100

A v D
120+40+100

C v D
120+50+90

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

C wins

vi. 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
D Third
B 4th

vii. Yes. independence of irelevant alternatives & condorcet

viii. i. 44

b. ii 23

iii. 12 (44/4+1)

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

A wins

A 1st
B 2nd
C Third
D 4th

1b cont'd

N. A: $18\times4 + 11\times1 + 9\times1 + 6\times1 = 98$

B = $18\times2 + 11\times4 + 9\times3 + 6\times2 = 119$ ← wins

C: $18\times1 + 11\times3 + 9\times4 + 6\times3 = 105$

D: $18\times3 + 11\times2 + 9\times2 + 6\times4 = 118$

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

Vi. A v B 18 | B v C 18+11

A v C 18 | B v D 18+6

A v D 18 | C v D 18+6

A	B	C	D
	11	1	111
4th	2nd	3rd	↑ Davis

vii. Rnd 1
A = 18
B: 11
C: 9
~~D: 6~~

Rnd 2
A = 18
~~B = 11~~
C = 15

Rnd 3
A: 18
C: 26 ← wins

A 2nd
B 3rd
D 4th

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: $5\times5 + 3\times2 + 3\times2 + 5\times3 + 3\times4 + 2\times4 = 82$ winner

H: $5\times2 + 3\times5 + 3\times3 + 5\times5 + 3\times1 + 2\times2 = 66$

B: $5\times1 + 3\times3 + 3\times5 + 5\times4 + 3\times3 + 2\times3 = 64$

F: $5\times3 + 3\times4 + 3\times1 + 5\times2 + 3\times3 + 2\times5 = 46$

S: $5\times4 + 3\times1 + 3\times4 + 5\times1 + 3\times2 + 2\times1 = 48$

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

12. cont'd

vi

H vs S 5+3+3 | S v N 5+3+3 | N v F 5+3+5

H v B 3+3+2 | S v B 5 | B v F 5+3+3

H v F 5+3+3 | S v F 3+5+3

H v N 5+3+2 | N v B 3+3+5

	B	F	S	N
H				
	III	I		II

↑ Fwins 1st

2nd tie H, B, N

3rd (tact) S

vii. Rnd 1

N: 5

H: 8

B: 3

F: 5

~~S: 0~~ ← 5th

Rnd 2

N: 5

H: 8

~~B: 3~~

F: 5

B 4th

Rnd 3

N: 5

H: 11 ← wins

F: 5

2nd ~~N~~ & F tied

viii. condorcet is violated

2. when they believe their candidate will lose regardless, but they can maybe prevent a less well-liked candidate from winning by voting for a 2nd favourite

3. Answers will vary

4.

# of Voters	6	2	3
1st	A	B	C
2nd	B	C	D
3rd	C	D	B
4th	D	A	A

5. a majority is more than 50% of votes; a plurality is the most votes. These need only be the same when there are only 2 candidates

6. Is there a majority? If there is no majority, there can be no violations.

7. No run-off election is needed (cheaper). ensures someone gets a majority. Less strategic voting

8. Monotonicity requires votes to change (2 elections or a straw poll to compare to is needed) and a candidate needs to get more votes (their position improves) but they end up worse off