

The rules: you may use your book and notes on this take-home exam. Your work is to be entirely your own: you may not talk to anybody else about the exam problems. If you are stuck with something, you may come to see me. Turn the exam in by Monday, May 6th, 3PM.

1. (30pts) A class of bored teenagers is trying to decide on what to use as a dare.¹ The choices are “jump from a tree”, “drink cow urine”, “sit in a restaurant refrigerator in summer clothes”, “excavate a yellow jacket nest without a pesticide”. Their preference rankings are shown below.

- a) Which choice wins the vote in a plurality election?
 b) Which choice wins the vote in a plurality election with elimination?
 c) Which choice is the pairwise comparison winner?
 d) Which choice is the winner using Borda's method?
 Perform the check on the sum of Borda points.

Votes	6	7	4	2	8	9	3
1st	D	D	E	J	J	S	S
2nd	E	J	S	S	E	D	J
3rd	J	S	D	D	S	J	E
4th	S	E	J	E	D	E	D

a) D $6+7=13$ wins
 E $4=4$
 J $2+8=10$
 S $9+3=12$

b) E eliminated
 in 1st round

D $13=13$
 J $10=10$
 S $12+4=16$

J eliminated
 in 2nd round

D $13+13=26$
 S $16+2+8=26$

c) D $13+2+9=24$ wins
 E $4+8+3=15$

Pairwise: D E S J } Tie among D, S, J
 2 0 2 2

D $13+4+9=26$ wins
 J $10+3=13$

D $13=13$
 S $12+4+2+8=26$ wins

E $4+6+3=13$
 J $10+7+9=26$ wins

E $4+8+8=18$
 S $12+7+2=21$ wins

J $10+6+7=23$ wins
 S $12+4=16$

d) D $4 \cdot 13 + 3 \cdot 9 + 2 \cdot 6 + 1 \cdot 11 = 102$
 E $4 \cdot 4 + 3 \cdot 14 + 2 \cdot 3 + 1 \cdot 18 = 82$
 S $4 \cdot 10 + 3 \cdot 10 + 2 \cdot 15 + 1 \cdot 4 = 104$ wins
 J $4 \cdot 12 + 3 \cdot 6 + 2 \cdot 15 + 1 \cdot 6 = 102$

$\frac{390}{390}$
 $= 39 \cdot 10$
 votes pts. per vote

¹Fictional morons. Do not attempt.

