Worksheet 3: Voting Theory (Borda Count & Copeland's Method) Group Names: Solutions

1. A different class is voting on what kind of ice cream to have. The choices are strawberry (S), chocolate (C), and vanilla (V). The students in the class ranked their ice cream choices and the following preference table was constructed.

					Durality
# votes	8	9	6	10	S = 8 + 6 = 14 < 17
1st choice	S	V	S	С	v = 9
2nd choice	V	С	С	V	
3rd choice	C	S	V	S	
 (a) How ma (b) Is there (c) Who is (d) Who is 	any s a m the the	stud najor plur winn V	ents Tity v ality ner c	were winne wini wini of this eli	e in the class? 33 er? <u>No.</u> $33/2 = 16:5 \iff \text{Needs 17.}$ ner? <u>Strawberry</u> s election using IRV? (show work below) <u>Chocolate</u> minated in round 1.
New schu 12^{tr} S (2^{cr} C s	edu <u>1</u> 2	le : 6 S C	10 C S		S = 8 + 6 = 14 C = 9 + 10 = 19 Chocolate wins in round Z.

(e) Who is the winner of this election using Borda Count? (show work below) Varilla

# votes	8	9	6	10
1st choice	S	V	S	С
2nd choice	V	С	С	V
3rd choice	С	S	V	S

3pt

2 pt

1 pt

$$S = 8(3) + 9(1) + 6(3) + 10(1) =$$

= 24 + 9 + 18 + 10 = 61
$$V = 8(2) + 9(3) + 6(1) + 10(2) =$$

= 16 + 27 + 6 + 20 = 69
$$C = 8(1) + 9(2) + 6(2) + 10(3) =$$

= 8 + 18 + 12 + 30 = 68

riere s ene prererence senegane again.	Here's	the	preference	schedule	again.
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# votes	8	9	6	10
1st choice	S	V	\mathbf{S}	С
2nd choice	V	С	С	V
3rd choice	С	S	V	S

(f) Compare all the head-to-head matchups. Who wins in each matchup? Is there a Condorcet winner?

S vs V	5 vs C	Vvs C
89610	89610	89610
1 ² SVSV	12 SCSC	IIN VVCC
2 nd VSVS	2 nd CSCS	2 nd CCVV
5= 8+6=14	5= 8+6= 14	V= 8+9=17
V= 9+10 = 19	C = 9 + 10 = 19	C = 6 + 10 = 16
V wins	Cwins	2~iu V
(g) Who is the win	nderat winner beause it was all ner using Copeland's method?	its head to head watchups.
V geti 2	paints because it was a	head-to-head matches
C gets l	point because it wor on	head-to-head matches
S gets O	points become it lost all l	read . to - head matches.
Ve is a surfle	Carloud's well al	

V urns under Copeland's method.

(h) Of these four methods, which one do you think was the most fair, and why? [This has many reasonable answers.]