1. The board of directors of the S.P. Martini Wealth Management Company is electing a new CEO. Under consideration are candidates A, B, and C. The ballots were cast as follows:

B	B	B	C	A	A	B	C	A	C	C	C	B	C	B	A	B	A
A	A	A	B	B	C	C	A	B	A	B	B	C	A	A	B	A	C
C	C	C	A	C	B	A	B	C	B	A	A	A	B	C	C	C	B

Using the plurality method, who, if anyone, won the election?

A. Candidates A and B tied.

B. Candidate B won the election.

C. All three candidates tied.

D. Candidates A and C tied.

E. Candidates B and C tied.

F. Candidate C won the election.

G. Candidate A won the election.

2. The Facilities Planning Committee for SWOCC is deciding on what color siding to install in the new Health and Sciences Building. The choices are Olive Green (G), Tan (T), Maroon (M), and Grey-Blue (B). The committee member cast their votes which are summarized in the follwing preference table.

Number of Votes	6	2	3	5	4
First Choice	M	M	T	B	T
Second Choice	G	T	G	M	M
Third Choice	B	G	M	G	B
Fourth Choice	T	B	B	T	G

(a) Using the plurality method, which choice wins the election?
(b) Is there a Condorcet Winner?
(c) Does this election violate Condorcet Criterion?

A. (a) Choice T wins the election. (b) Yes. (c) No.

B. (a) Choice T wins the election. (b) No. (c) No.

C. (a) Choice M wins the election. (b) Yes. (c) Yes.

D. (a) Choice M wins the election. (b) No. (c) Yes.

E. (a) Choice T wins the election. (b) No. (c) Yes.

F. (a) Choice M wins the election. (b) Yes. (c) No.

G. (a) Choice M wins the election. (b) No. (c) No.

H. (a) Choice T wins the election. (b) Yes. (c) Yes.

3. The Associated Student Government has put to a vote where their end-of-the-year banquet is to be held. The contenders are four following restaurants: Tokyo Bistro (T), Sharkbites (S), Captain's Choice (C), and the Pancake Mill (P).

C	S	T	P	C	S	P	P	P	C	T	S	S	P	S	C	S	P	T
S	P	C	S	P	C	S	S	T	T	S	C	T	C	T	T	P	C	P
T	T	P	T	T	T	C	C	C	S	C	T	P	T	C	P	C	S	S
P	C	S	C	S	P	T	T	S	P	P	P	C	S	P	S	T	T	C

How many people marked candidate S as their first choice?

A. 4

B. 5

C. 3

D. 6

E. 1

F. 7

G. 2

H. 0

4. Midland City High School is voting on what their new mascot will be. On the ballot are "The Sugar Gliders" (S), "The Wombats" (W), and "Platypi" (P).The ballots were cast as follows: On the day of the election, students cast their ballots which are summarized by the following preference table.

Number of Votes	69	57	58	72	75	56
First Choice	S	S	W	W	P	P
Second Choice	W	P	S	P	S	W
Third Choice	P	W	P	S	W	S

Using the Borda-Count Method decide which choice, if any, wins the election.

A. Choices W and P tied.

B. Choices S and P tied.

C. Choice W wins the election.

D. Choice P wins the election.

E. Choice S wins the election.

F. Choices S and W tied.

G. All three Choices tied.

5. A Math 105 Class at SWOCC is deciding on the next topic they will study. The choices are statistics (S), financial mathematics (F), and logic (L). On the day of the election, 20 students cast their ballots which are summarized by the following preference table.

Number of Votes	6	7	11	4
First Choice	L	S	L	S
Second Choice	S	L	F	F
Third Choice	F	F	S	L

(a) Using the Borda-Count Method, which choice wins the election?
(b) Is there a choice which has a majority of first-place votes?
(c) Does this election violate the majority criterion?

A. (a) Choice S wins the election. (b) No. (c) Yes.

B. (a) Choice S wins the election. (b) Yes. (c) No.

C. (a) Choice L wins the election. (b) Yes. (c) Yes.

D. (a) Choice S wins the election. (b) No. (c) No.

E. (a) Choice L wins the election. (b) Yes. (c) No.

F. (a) Choice L wins the election. (b) No. (c) No.

G. (a) Choice L wins the election. (b) No. (c) Yes.

H. (a) Choice S wins the election. (b) Yes. (c) Yes.

6. Billy Bob is on the planning committee for the Oregon Moonshiners Association and has called for a vote on which city to hold their annual convention. This year the contenders are Coos Bay (C), Portland (P), and Eugene (E). The members of the committee cast their votes as follows:

Number of Votes	7	13	11	10
First Choice	C	E	P	C
Second Choice	E	C	E	P
Third Choice	P	P	C	E

(a) Using Instant Runoff Voting, which choice wins the election?
(b) Suppose every one in the last column changed their vote to E-C-P. Does this change the outcome of the election?
(c) Does your answer for part (b) cause this election to violate the Monotonicity Criterion?

A. (a) Choice E wins the election. (b) Yes. (c) No.

B. (a) Choice C wins the election. (b) No. (c) Yes.

C. (a) Choice E wins the election. (b) Yes. (c) Yes.

D. (a) Choice C wins the election. (b) No. (c) No.

E. (a) Choice E wins the election. (b) No. (c) No.

F. (a) Choice C wins the election. (b) Yes. (c) Yes.

G. (a) Choice E wins the election. (b) No. (c) Yes.

H. (a) Choice C wins the election. (b) Yes. (c) No.

7. A Math 105 Class at SWOCC is deciding on the next topic they will study. The choices are statistics (S), financial mathematics (F), and logic (L). On the day of the election, 21 students cast their ballots which are summarized by the following preference table.

Number of Votes	5	6	10
First Choice	L	L	F
Second Choice	S	F	S
Third Choice	F	S	L

(a) Using the Borda-Count Method, which choice wins the election?
(b) Is there a choice which has a majority of first-place votes?
(c) Does this election violate the majority criterion?

A. (a) Choice F wins the election. (b) No. (c) Yes.

B. (a) Choice F wins the election. (b) No. (c) No.

C. (a) Choice L wins the election. (b) No. (c) No.

D. (a) Choice L wins the election. (b) No. (c) Yes.

E. (a) Choice L wins the election. (b) Yes. (c) No.

F. (a) Choice L wins the election. (b) Yes. (c) Yes.

G. (a) Choice F wins the election. (b) Yes. (c) No.

H. (a) Choice F wins the election. (b) Yes. (c) Yes.

8. Midland City High School is voting on what their new mascot will be. On the ballot are "The Sugar Gliders" (S), "The Wombats" (W), and "Platypi" (P).The ballots were cast as follows: On the day of the election, students cast their ballots which are summarized by the following preference table.

Number of Votes	18	20	21	13	15	22
First Choice	S	S	W	W	P	P
Second Choice	W	P	S	P	S	W
Third Choice	P	W	P	S	W	S

Using the Pairwise Comparison Method, how many points did each choice receive?

A. Choice S : 3. Choice W : 3. Choice P : 3.

B. Choice S : 3. Choice W : 3.5. Choice P : 3.5.

C. Choice S : 1. Choice W : 1. Choice P : 1.

D. Choice S : 3.5. Choice W : 1.5. Choice P : 2.

E. Choice S : 2.5. Choice W : 2. Choice P : 1.5.

F. Choice S : 2. Choice W : 0. Choice P : 1.

G. Choice S : 1.5. Choice W : 2.5. Choice P : 1.

9. The Associated Student Government has put to a vote where their end-of-the-year banquet is to be held. The contenders are four following restaurants: Tokyo Bistro (T), Sharkbites (S), Captain's Choice (C), and the Pancake Mill (P). The ballots were cast and tallied. The results are summarized by the preference table below.

Number of Votes	6	3	1	7
First Choice	T	C	C	P
Second Choice	S	T	S	C
Third Choice	C	S	P	T
Fourth Choice	P	P	T	S

Using the Pairwise Comparison Method, how many points did each choice receive?

A. Choice T : 0. Choice S : 3. Choice C : 1.5 Choice P : 1.5.

B. Choice T : 2. Choice S : 1. Choice C : 3. Choice P : 0.

C. Choice T : 1.5. Choice S : 2. Choice C : 1 Choice P : 1.5.

D. Choice T : 2. Choice S : 1. Choice C : 3 Choice P : 0.

E. Choice T : 2. Choice S : 0. Choice C : 3 Choice P : 1.

F. Choice T : 3. Choice S : 1.5. Choice C : 2 Choice P : 0.5.

G. Choice T : 3.5. Choice S : 2. Choice C : 0 Choice P : 0.5.

H. Choice T : 1. Choice S : 3. Choice C : 2 Choice P : 0.

10. The Associated Student Government has put to a vote where their end-of-the-year banquet is to be held. The contenders are four following restaurants: Tokyo Bistro (T), Sharkbites (S), Captain's Choice (C), and the Pancake Mill (P). The ballots were cast and tallied. The results are summarized by the preference table below.

Number of Votes	6	8	19	17
First Choice	P	C	P	S
Second Choice	T	P	S	C
Third Choice	C	T	C	P
Fourth Choice	S	S	T	T

(a) Using the Pairwise Comparison Method, which choice wins the election?
(b) Suppose that after the election we find out that the on the night of the banquet S is already hosting another big event and cannot cater our event. We do a recount of the ballots without S. Does this change the outcome of the election?
(c) Does your answer for part (b) cause this election to violate the Irrelevant Alternatives Criterion?

A. (a) Choice P wins the election. (b) Yes. (c) No.

B. (a) Choice P wins the election. (b) Yes. (c) Yes.

C. (a) Choice S wins the election. (b) No. (c) No.

D. (a) Choice P wins the election. (b) No. (c) No.

E. (a) Choice S wins the election. (b) No. (c) Yes.

F. (a) Choice P wins the election. (b) No. (c) Yes.

G. (a) Choice S wins the election. (b) Yes. (c) No.

H. (a) Choice S wins the election. (b) Yes. (c) Yes.

Answers

1. B.
2. F.
3. D.
4. D.
5. E.
6. E.
7. H.
8. C.
9. B.
10. B.