

1. Number of Voters (15)

| <u>Rank</u> | <u>4</u> | <u>3</u> | <u>2</u> |
|-------------|----------|----------|----------|
| First | A | C | B |
| Second | B | B | C |
| Third | C | A | A |

2. Number of Voters (209)

| <u>Rank</u> | <u>100</u> | <u>99</u> | <u>10</u> |
|-------------|------------|-----------|-----------|
| First | A | C | B |
| Second | B | B | C |
| Third | C | A | A |

Math 181
9/10/08

3. (8 points) Complete the following definitions with the correct statement (1), (2) or (3). It suffices to write the *number* of the correct statement!

a. A voting system satisfies **Independence of Irrelevant Alternatives** provided ().

b. A voting system satisfies **Monotonicity** provided ().

The correct statements (taken verbatim from the book) may be found below.

(1) every voter's ranking of one candidate higher than another precludes the possibility of this latter candidate winning.

(2) the only way a candidate (call him A) can go from losing one election to being among the winners of a new election (with the same set of candidates and voters) is for at least one voter to reverse his or her ranking of A and the previous winner.

(3) ballot changes favorable to one candidate (and not favorable to any other candidate) can never hurt that candidate.

5. (15 points) There are three candidates running in an election with 19 voters. Five voters prefer the candidates in the order A,B,C. Five voters prefer the candidates in the order B,A,C. Five voters prefer the candidates in the order C,A,B. Four voters prefer the candidates in the order C,B,A.

a. Calculate the winner using sequential pairwise voting with the agenda A,B,C.

b. Is there a Condorcet winner in this election? If so, who? If not, why not?

c. Suppose this were an election using approval voting and the top two candidates for each voter were approved. (That is, the first five voters find A and B acceptable, the next five find B and A acceptable, the next five find C and A acceptable and the last four find C and B acceptable.) If only one person is elected, who wins?

1. (21 points) In an election with four candidates A, B, C, D, there are 21 voters, whose preferences are listed below.

| Rank | <u>7</u> | <u>6</u> | <u>5</u> | <u>3</u> |
|------|----------|----------|----------|----------|
| 1st | A | B | C | D |
| 2nd | B | C | B | C |
| 3rd | D | A | D | B |
| 4th | C | D | A | A |

a. Calculate the winner using plurality voting.

b. Calculate the winner using the Borda count.

c. Calculate the winner using the Hare system. Show *clearly* the results of the intermediate votes.

X...BIND HERE...X
 TO THE CLERK OF THE CITY OF URBANA
 PETITION FOR THE CHANGE OF MUNICIPAL ELECTION CODE

We, the undersigned residents and legal voters of the City of Urbana, Champaign County, Illinois, respectfully petition that you cause to be submitted, in the manner provided by law, to the voters thereof, at the primary election to be held on February 5, 2008, the proposition below:

Shall the People of the City of Urbana amend "Article II - Elected Officials" of the Code of Ordinances, City of Urbana, Illinois, to read as follows: "THE ELECTION PROCESS FOR ELECTION OF MAYOR, CITY COUNCIL MEMBERS, AND OTHER ELECTED CITY OFFICERS SHALL BE CONDUCTED BY ADOPTING AND AUTHORIZING INSTANT RUN-OFF VOTING AND REPEALING CONFLICTING STATUTES.

Section 1. Instant Run-off Voting

The ballots used in these elections shall provide that the voter may vote for candidates in order of preference as per number of candidates for that office and not assign the same ranking to more than one candidate for each office.

Section 2. Counting of Ballots

(a) In Round One of counting the first choice votes of each voter shall be counted. If, after all ballots are counted, a candidate has obtained a majority of first choice votes for that race, further counting is not necessary, and that candidate shall be declared the winner.

(b) If no candidate has obtained a majority of the first choice votes in Round One, then the candidate with the fewest number of votes in that round shall be declared defeated and initiate an instant runoff process. The second choice votes on the defeated candidate's ballots shall be transferred to the second choice candidates and added to their vote total. This process then repeats for a third round and subsequent rounds as necessary until a candidate receives a majority of votes cast, in which case that candidate is declared the majority winner.

(c) If, in any election, a ballot has no more available preferences stated (or) has the same ranking assigned to more than one candidate for the same office (or) skips a ranking, then that ballot shall be declared exhausted and shall not be counted further.

(d) If there is a tie vote between candidates, the procedures of IL. Rev. Statutes for elections shall be followed.

| | SIGNATURE | PRINT NAME | STREET OR COUNTY ROAD ADDRESS | CITY | COUNTY |
|----|-----------|------------|-------------------------------|--------|---------------------|
| 1 | | | | Urbana | Champaign, Illinois |
| 2 | | | | Urbana | Champaign, Illinois |
| 3 | | | | Urbana | Champaign, Illinois |
| 4 | | | | Urbana | Champaign, Illinois |
| 5 | | | | Urbana | Champaign, Illinois |
| 6 | | | | Urbana | Champaign, Illinois |
| 7 | | | | Urbana | Champaign, Illinois |
| 8 | | | | Urbana | Champaign, Illinois |
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| 10 | | | | Urbana | Champaign, Illinois |
| 11 | | | | Urbana | Champaign, Illinois |
| 12 | | | | Urbana | Champaign, Illinois |
| 13 | | | | Urbana | Champaign, Illinois |
| 14 | | | | Urbana | Champaign, Illinois |
| 15 | | | | Urbana | Champaign, Illinois |

STATE OF ILLINOIS
 County of Champaign

I, _____, do hereby certify that I reside at _____ Street, in the City/ Village/ Unincorporated Area (circle one) of _____, Zip Code _____, County of Champaign, in the State of Illinois, that I am 18 years of age or older, that I am a citizen of the United States, and that the signatures on this sheet were signed in my presence, not more than 4 months preceding the last day for filing of the petitions, that they were signed between _____ and _____, and are genuine, and that to the best of my knowledge and belief the persons so signing were at the time of signing the petition registered voters of the City of Urbana and that their respective residences are correctly stated as above set forth.

 (Signature of Person Making this Affidavit)

Signed and sworn to (or affirmed) by _____ before me on _____
 (Name of Circulator) (insert month, day, year)

 NOTARY PUBLIC

(SEAL)