

Name: \_\_\_\_\_

MA111  
Ch. 1 Exam Review  
2011-09-09

**Instructions:** No books or notes may be used on this exam. You will have 50 minutes to answer all of the following questions. Additional paper is available if necessary. Please write legibly and keep your paper as organized as possible. Show all of your work! Answers without work or explanation will not receive full credit. Please use complete sentences where appropriate to explain your responses. Each part is worth 25% of the exam.

## Part I: Vocabulary

Match the type of winner to the description, by writing the letter of the definition next to the term.

- \_\_\_\_\_ Majority winner
- \_\_\_\_\_ Condorcet winner
- \_\_\_\_\_ Plurality winner
- \_\_\_\_\_ Borda Count winner
- \_\_\_\_\_ Plurality w/ elimination winner
- \_\_\_\_\_ Pairwise comparison winner

- (A) A candidate with more than 50% of the first place votes
- (B) A candidate who outranks every other candidate head-to-head
- (C) A candidate with the most first place votes
- (D) Each first place vote gets the most points, one less point for second place votes, etc. Most total points wins.
- (E) The last surviving candidate during the game: the candidate with the least first place votes is eliminated, repeat.
- (F) A candidate that wins more head-to-head matchups than any other candidate

## Part II: Vote counting

For each method, show how one calculates the winner based on the following preference schedule. Make sure to clearly indicate which candidate is the final winner for each method. Merely giving the winner without showing how the winner was decided receives **no** credit.

|     | 7 | 6 | 5 | 3 |
|-----|---|---|---|---|
| 1st | D | B | A | C |
| 2nd | A | C | C | D |
| 3rd | C | A | B | B |
| 4th | B | D | D | A |

- Plurality:

- Borda:

- Plurality with elimination:

- Pairwise comparison:

## Part III: Strategic Voting

In each of the following elections<sup>1</sup>, This election is decided by the stated method, and the voters' secret feelings are revealed to the right. Answer the following three questions for each:

- (a) If everyone votes honestly, who wins?
- (b) Which candidates would the voters from the first column prefer?
- (c) Can the first column of voters lie to change the outcome to one of their preferred candidates?

Plurality:

|     |     | 8 | 7 | 3 |
|-----|-----|---|---|---|
| (a) | 1st | A | C | C |
|     | 2nd | B | B | A |
| (b) | 3rd | C | A | B |

(c)

Borda count

|     |     | 8 | 7 | 3 |
|-----|-----|---|---|---|
| (a) | 1st | A | C | C |
|     | 2nd | B | B | A |
| (b) | 3rd | C | A | B |

(c)

Plurality with elimination

|     |     | 2 | 9 | 8 | 7 |
|-----|-----|---|---|---|---|
| (a) | 1st | C | B | A | C |
|     | 2nd | A | C | B | A |
| (b) | 3rd | B | A | C | B |

(c)

Pairwise comparisons

|     |     | 9 | 6 | 3 |
|-----|-----|---|---|---|
| (a) | 1st | B | D | A |
|     | 2nd | A | A | C |
| (b) | 3rd | C | B | D |
|     | 4th | D | C | B |

(c)

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<sup>1</sup>There will only be 2 elections on the real exam, but the questions might be a little different.

## Part IV: Fairness

Explain your reasoning very carefully. If it **can** happen, then give an example where it **does** happen. If it cannot, then explain clearly why it is impossible.<sup>2</sup>

- Can a candidate with **no** first place votes be a Condorcet winner?
- Can a Condorcet winner lose an election decided by plurality?
- Can a majority winner lose an election decided by plurality?
- Can a majority winner have more than 50% of the last place votes?
- Can a majority winner have the most last place votes?

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<sup>2</sup>Two of these five questions will be on the exam. The last two questions are due to Amadeusz Pyrek.