Name: _____

Math 203: Contemporary Mathematics

Chapter 3 test, version (a)

Tuesday, April 21, 2009

60 points

Instructions:

1. This test has 4 pages (including this one) and 2 questions. Please check that you have all of the pages.
2. Read each question carefully. If you have any questions, please ask.
3. Answer all of the following questions clearly and completely. Justify all of your answers. Most of the points you receive will be based on the accuracy, completeness, and clarity of your responses. Use full sentences, and avoid saying things that are untrue, ambiguous, or nonsensical.
4. You may use a calculator for this test, but you may not use a book or any notes.
5. Give your answer to each question completely and clearly in the space provided. You may use the back of the test pages for scratch work; however, if you want this work to be considered, please make note of it in the space provided for the question.
6. Erase or cross out work you do not wish to be graded.
7. You have 25 minutes to complete this test. Good luck!

Question 1. (36 points.) Suppose there are four candidates (A, B, C, and D) running for election in a district that has 36 voters. The preferences of these voters are listed in the following preference table.

	Number of voters				
Ranking	8	3	6	10	9
1st	A	A	C	D	B
2nd	B	D	B	C	C
3rd	C	C	A	B	D
4th	D	B	D	A	A

DO THREE OF THE FOUR PARTS OF THIS QUESTION.
(Two of the four parts are on the next page.)

(a) (12 points.) Which candidate wins if the plurality method is used? Why?

(b) (12 points.) Which candidate wins if the Borda count method is used? Why?

(c) (12 points.) Which candidate wins if the plurality with elimination method is used? Why?

(d) (12 points.) Which candidate wins if the pairwise comparison method is used? Why?

Question 2. (24 points.) Nine city council members vote on three renovation proposals, A, B, and C, for the city center. Consider the members' preferences as given in the following table.

	Number of voters			
Ranking	3	3	2	1
1st	C	A	B	A
2nd	B	C	C	B
3rd	A	B	A	C

(a) (8 points.) Which plan is adopted under the plurality method? Why?

(b) (8 points.) Form all pairwise comparisons and determine the winner of each. (Actually, it's fine if you just want to look at the pairwise comparisons that involve C.)

(c) (8 points.) Consider the results from parts (a) and (b), and identify which criterion has been violated. Explain. (Remember that the four criteria we discussed are the majority criterion, the head-to-head criterion, the monotonicity criterion, and the irrelevant-alternatives criterion.)

Name: _____

Math 203: Contemporary Mathematics

Chapter 3 test, version (b)

Tuesday, April 21, 2009

60 points

Instructions:

1. This test has 4 pages (including this one) and 2 questions. Please check that you have all of the pages.
2. Read each question carefully. If you have any questions, please ask.
3. Answer all of the following questions clearly and completely. Justify all of your answers. Most of the points you receive will be based on the accuracy, completeness, and clarity of your responses. Use full sentences, and avoid saying things that are untrue, ambiguous, or nonsensical.
4. You may use a calculator for this test, but you may not use a book or any notes.
5. Give your answer to each question completely and clearly in the space provided. You may use the back of the test pages for scratch work; however, if you want this work to be considered, please make note of it in the space provided for the question.
6. Erase or cross out work you do not wish to be graded.
7. You have 25 minutes to complete this test. Good luck!

Question 1. (24 points.) Nine city council members vote on three renovation proposals, A, B, and C, for the city center. Consider the members' preferences as given in the following table.

	Number of voters			
Ranking	3	3	2	1
1st	C	A	B	A
2nd	B	C	C	B
3rd	A	B	A	C

(a) (8 points.) Which plan is adopted under the plurality method? Why?

(b) (8 points.) Form all pairwise comparisons and determine the winner of each. (Actually, it's fine if you just want to look at the pairwise comparisons that involve C.)

(c) (8 points.) Consider the results from parts (a) and (b), and identify which criterion has been violated. Explain. (Remember that the four criteria we discussed are the majority criterion, the head-to-head criterion, the monotonicity criterion, and the irrelevant-alternatives criterion.)

Question 2. (36 points.) Suppose there are four candidates (W, X, Y, and Z) running for election in a district that has 36 voters. The preferences of these voters are listed in the following preference table.

	Number of voters				
Ranking	6	9	3	10	8
1st	W	X	Y	Z	Y
2nd	X	W	Z	W	X
3rd	Y	Z	W	X	W
4th	Z	Y	X	Y	Z

DO THREE OF THE FOUR PARTS OF THIS QUESTION.
(Two of the four parts are on the next page.)

(a) (12 points.) Which candidate wins if the plurality method is used? Why?

(b) (12 points.) Which candidate wins if the Borda count method is used? Why?

(c) (12 points.) Which candidate wins if the plurality with elimination method is used? Why?

(d) (12 points.) Which candidate wins if the pairwise comparison method is used? Why?