

Marks

- [8] 1. Consider the matrix game

$$A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$$

For each matrix find (1) the value of the game “Alice Announces,” (2) the value of the game “Betty Announces,” (3) the duality gap in the “Announce” games, (4) the value and equilibrium strategies of the “Scream” games.

- [8] 2. Consider the problem: maximize $x_1 + x_2$ subject to $x_1 \leq 5$, $x_1 + x_2 \geq 2$, $x_1, x_2 \geq 0$. Write this as a linear program in standard form. Use the two-phase method, **adding an auxiliary variable x_0 to EVERY slack variable equation in the dictionary**, to solve this LP. Use the smallest subscript rule to break any ties for entering or leaving variables.

- [8] **3.** Consider our usual LP: maximize $4x_1 + 5x_2$ subject to $x_1 + 2x_2 \leq 8$, $x_1 + x_2 \leq 5$, $2x_1 + x_2 \leq 8$, and $x_1, x_2 \geq 0$. Write the slack variables for this linear program, and write down the dual linear program and dual slack variables.

Check to see if the following are optimal solutions to the primal linear program using complementary slackness:

(a) $x_1 = 4, x_2 = 0$;

(b) $x_1 = 0, x_2 = 4$;

- [8] 4. Consider the LP: maximize x_1 subject to $x_1 \leq x_2$, $x_2 \leq x_3$, $x_3 \leq 4$, and $x_1, x_2, x_3 \geq 0$. Show how the perturbation method ensures that you increase z with every pivot. Does it matter (to the pivots that you make) whether you take $\epsilon_1 \gg \epsilon_2 \gg \epsilon_3$ or take the reverse?

The End

Be sure that this examination has 7 pages including this cover

The University of British Columbia

Midterm Examinations - March 2010

Mathematics 340–201

Closed book examination

Time: 60 minutes

Name _____ Signature _____

Student Number _____ Instructor's Name _____

Section Number _____

Special Instructions:

THIS EXAM IS TWO-SIDED! You will be given a note sheet. Calculators, other notes, or other aids may not be used. Answer questions on the exam.

Rules governing examinations

1. Each candidate should be prepared to produce his library/AMS card upon request.

2. Read and observe the following rules:

No candidate shall be permitted to enter the examination room after the expiration of one half hour, or to leave during the first half hour of the examination.

Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination questions.

CAUTION - Candidates guilty of any of the following or similar practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.

(a) Making use of any books, papers or memoranda, other than those authorized by the examiners.

(b) Speaking or communicating with other candidates.

(c) Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.

3. Smoking is not permitted during examinations.

1		8
2		8
3		8
4		8
Total		32