

4113: Math Econ Midterm

Instructor: Sasha Vostroknutov

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YOUR NAME:.....

YOU HAVE 1 HOUR 15 MINUTES. THERE ARE 6 PAGES AND 2
QUESTIONS.

DO NOT FORGET TO CHECK CONSTRAINT QUALIFICATION.

THERE IS A LIST OF PROPERTIES OF PREFERENCE RELATIONS
ON THE LAST PAGE.

THE MAXIMIZATION PROBLEM DOES HAVE SIMPLE SOLUTION.
IF YOUR FIRST ORDER CONDITIONS GET TOO COMPLICATED
THINK!

GOOD LUCK!

1. Solve the following problem

$$\begin{aligned} \max_{x,y,z \in \mathbb{R}} \quad & e^z xy + x + y \\ \text{s.t.} \quad & x + y + e^z \leq 2 \\ & z(x + 3y) \geq 0 \\ & x, y, z \geq 0 \end{aligned}$$

2. Consider the preference relation \succ over \mathbb{R}^2 defined like this:

$$(x, y) \succ (x', y') \text{ if and only if } x > x' \text{ and } y > y'$$

a) Is \succ complete? Prove your claim.

b) Is \succ transitive? Prove your claim.

c) Is \succ reflexive or irreflexive? Prove your claim.

d) Is \succ symmetric or asymmetric? Prove your claim.

Suppose we have a binary relation R (you can use any other symbol, for example \succsim) on the set of alternatives X . Remember that $R \subseteq X^2$ and for $x, y \in X$ we say that xRy is true if $(x, y) \in R$. Here are some definitions. You should read the statements below as follows: R is **reflexive** if for all $x \in X$ it is true that xRx .

reflexive if xRx

irreflexive if $\neg(xRx)$

transitive if xRy and $yRz \Rightarrow xRz$

complete if xRy or yRx or both

symmetric if $xRy \Rightarrow yRx$

asymmetric if $xRy \Rightarrow \neg yRx$