Università Ca' Foscari di Venezia - Dipartimento di Economia - A.A.2016-2017
Mathematics (Curriculum Economics, Markets and Finance)

Second call - Prof. Luciano Battaia

2017/01/31

Surname: | | | | | | | | | | | | | | | | |

Name: | | | | | | | | | | | | | | | | |

Matriculation Number: | | | | | | |

Legible student's signature: ______________________________

Instructions.

1. Use of programmable or graphing calculators is not allowed.
2. Exchanging information or communication with other people, as well as any other form of cheating, implies the immediate disqualification of your exam.
3. Points for correct exercise: 6 points for each exercise. You are asked to *justify* your answers.
4. Please give back *only* these sheets to the instructor: all needed calculations and explanations must be written on these sheets.

Grade (reserved to teacher)

Ex.1	
Ex.2	
Ex.3	
Ex.4	
Ex.5	

Exercise 1. *Consider the function* $f : \mathbb{R} \to \mathbb{R}$

$$f(x) = \begin{cases} x^3 + x^2 + b, & \text{if } x \leq 0; \\ e^{ax} + x, & \text{if } x > 0. \end{cases}$$

a) *Find a and b so that the function is continuous and differentiable everywhere.*
b) *Find the limits of f as $x \to \pm\infty$.*
c) *Find all local maximum and minimum points of f.*
d) *Say whether f has global maximum and/or minimum.*
e) *Find the inflection points of f.*

Exercise 2. *Consider the function* $f:\mathbb{R}\to\mathbb{R}$

$$f(x)=x^2-1.$$

a) *Find the antiderivative* $F(x)$ *for which* $F(1)=0$.
b) *Find the local maximum and minimum points of* F.
c) *Find the global maximum and minimum of* F *(if they exist).*
d) *Find the inflection points od* F.

Exercise 3. *Consider the two variables real function*

$$f(x,y) = x^3 + y^3 - 3xy.$$

Find all local maximum, minimum and saddle points.

Exercise 4. *Consider the two variables real function*

$$f(x,y) = x + y + 1.$$

Find the global maximum and minimum on the constraint $x^2 + y^2 - 2 = 0$, *using the Lagrangian multiplier method.*

Exercise 5. *Consider the linear system*

$$\left\{\begin{array}{l} x+y+2z=-1 \\ 2x-y+2z=-4 \\ 4x+y+4z=-2 \end{array}\right. .$$

Prove that it is consistent and solve it, using Cramer's rule.