

# MATHEMATICS 2

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## Exam

//2017, A.Y. 2015/2016

Lastname ..... Name .....

1) (10 p.ts) Solve the following integral

$$\int e^{2x} \ln(1 + e^x) dx$$

2) (10 p.ts) Given the following linear system

$$\begin{cases} x & -(k+1)y & = k \\ 2x & -2y & = 2k \\ (k+2)x & +(k-2)y & = 0 \end{cases}$$

discuss and find solutions as  $k$  changes.

3) (10 p.ts) Find local maxima and minima of the function

$$f(x, y) = xy$$

in the region

$$C = \{(x, y) \in \mathbb{R}^2 : x^2 + y^2 + xy - 1 = 0\}$$