

05 Exam

Students have 120 minutes and can use any literature (notes, tables, textbooks...), but no technical devices (phone, calculator, watches...).

Good luck!

Example of the written part

1. (7 points) Compute the determinant of the following matrix

$$\begin{pmatrix} 1 & 0 & -1 & -4 \\ -2 & 3 & 0 & 1 \\ 2 & 0 & 3 & 4 \\ 1 & 1 & 2 & 3 \end{pmatrix}$$

2. (9 points) Show that

$$\log(1 + 2x^2 + 3y^4) + (x - y^2)^3 + \sin(x + y) = 0$$

determines at some neighborhood of the point $[0, 0]$ implicitly given function with variable x . Compute the first derivative of this function at the point $[0, 0]$.

3. (9 points)

Find global maximum and minimum of the function f on the set M .

$$f(x, y) = x^2 + y^2 + 16x - 12y, \quad M = \{[x, y] \in \mathbb{R}^2; x^2 + y^2 \leq 25\}.$$