Coursework (2) for *Introductory Lectures on Optimization*

Your name
Your ID

Oct. 10, 2024

Excercise 1. For the function $f(x) : \mathbb{R}^n \to \mathbb{R}^m$, please write down the zeroth-order Taylor expansion with an integral remainder term.

Solution of Excercise 1: bla.bla... bla bla.. bla. $\square$

Excercise 2. Please write down the definition of the p-norm for a n-dimensional real vector.

Solution of Excercise 2: bla.bla... bla bla.. bla. $\square$

Excercise 3. Please write down the definition of the matrix norms induced by vector p-norms.

Solution of Excercise 3: bla.bla... bla bla.. bla. $\square$

Excercise 4. Let A be an $n \times n$ symmetric matrix. Proof that A is positive semidefinite if and only if all eigenvalues of A are nonnegative. Moreover, A is positive definite if and only if all eigenvalues of A are positive.

Proof of Excercise 4: bla.bla... bla bla.. bla. $\square$

Excercise 5. Suppose that $f : \mathbb{R}^n \to \mathbb{R}$ is convex and upper bounded. Show that f must be a constant function.

Proof of Excercise 5: bla.bla... bla bla.. bla. $\square$