

MATE 4052 assignment 5

Not to be handed in.

Exercises 2.1, 2.2, 2.4.

For each of the norms on R^n : $\|x\|_\infty = \sup |x_i|$, $\|x\|_1 = \sum |x_i|$, find the set of points where $\|x\|$ is differentiable. (See Coleman).

Find the differentials of the functions defined on R^n :

- (a) $f(x) = a \cdot x$ where a is a fixed vector in R^n .
- (b) $f(x) = \|x\|^2$.
- (c) $f(x) = x \cdot g(x)$, where $g : R^n \rightarrow R^n$ is a linear function.

Find the differential of $f : \text{Isom}(R^n) \times M_n(R) \rightarrow M_n(R)$, $(X, Y) \mapsto X^{-1}Y$, where $\text{Isom}(R^n)$ is the set of invertible $n \times n$ matrices.