

Homework 2 — Theory

Due: May 10, 2026

Consider a layer in a neural network whose input is an invertible matrix $A \in \mathbb{R}^{n \times n}$ and whose output is A^{-1} . What is the backward of this layer ($\frac{\partial \mathcal{L}}{\partial A}$)?

Guidance: first, express the Jacobian $\frac{\partial A^{-1}}{\partial A}$ (think about what type of object it is). Then use the chain rule to obtain $\frac{\partial \mathcal{L}}{\partial A}$. You may work with tensor operations or with index notation (e.g. A_{ij})—whichever you prefer.