Mathematical exercise: Optimization

June 8, 2020

1 Proving convex and non-convex functions

a) Prove that the function $(x-1)^2 * (x+1)$ is non-convex for $x \in \mathbb{R}$

b) Prove that the same function is convex on the range from $x \in [1, \infty[$

2 Prove that the following function is convex. $f(\mathbf{x}) = log \sum_i \exp(x_i)$. Note that this is the normalization of the softmax.