# Assignment 1 Notes

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## Contents



## 1 Assigment 1

1.a) Softmax function $\text{softmax}(x)_i = \frac{e^{x_i}}{\sum_j e^{x_j}}$

$$\text{softmax}(x+c)_i = \frac{e^{x_i+c}}{\sum_j e^{x_j+c}} = \frac{e^c e^{x_i}}{e^c \sum_j e^{x_j}} = \frac{e^{x_i}}{\sum_j e^{x_j}} = \text{softmax}(x)_i$$

2.a) Derivative of the sigmoid function $\sigma(x) = \frac{1}{1+e^{-x}}$

$$\frac{\partial}{\partial x}\sigma(x) = \frac{e^{-x}}{(1+e^{-x})^2} = \frac{1}{1+e^{-x}}\,\frac{e^{-x}}{1+e^{-x}} = \sigma(x)(1-\sigma(x))$$