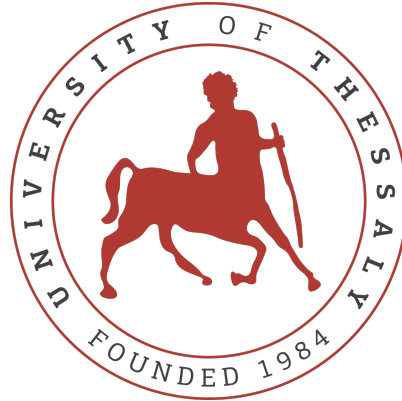


UNIVERSITY OF THESSALY



NEURO-FUZZY COMPUTING

ECE447

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## 2<sup>nd</sup> Problem Set

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Alexandra Gianni Nikos Stylianou

ID: 3382

ID: 2917

January 19, 2024

### Problem 3

For the given neural network, we have:

- $w^1(0) = -3$ ,  $w^2(0) = -1$ ,
- $b^1(0) = 2$ ,  $b^2(0) = -1$  and
- input/target pair  $\{p = 1, t = 0\}$

The output of the first layer is:

$$n^1 = w^1 p + b^1 = (-3)(1) + 2 = -1$$

$$a^1 = \text{Swish}(n^1) = \text{Swish}(-1) = \frac{n^1}{1 + e^{-n^1}} = \frac{-1}{1 + e} = -0.2689$$

The output of the second layer is then:

$$n^2 = w^2 a^1 + b^2 = (-1)(-0.2689) + (-1) = -0.7311$$

$$a^2 = \text{LReLU}(n^2) = \text{LReLU}(-0.7311) = 0.001$$

So, the error calculated is:

$$e = t - a^2 = (1 - (0.001)) = 0.999 \approx 1$$

Now, we can apply back-propagation starting from the second layer:

$$s^2 = -2\text{LReLU}'(n^2)(t - a)$$