2.7. Sigmoid: Probability of selecting class/action/option a given $H_t(a)$ in time t.

$$\int_a = \frac{\exp\{H_t(a)\}}{\sum_{b=1}^{k} \exp\{H_t(b)\}},$$

In the binary case:

$$\int_a = \frac{\exp\{H_t(a)\}}{\exp\{H_t(a)\} + \exp\{H_t(b)\}} = \frac{1}{1 + \exp\{H_t(b) - H_t(a)\}}$$

Replacing $\theta = -(H_t(b) - H_t(a))$

$$= \frac{1}{1 + \exp\{-\theta\}}$$

$= \sigma(\theta)$: Sigmoid function.

This implies that the soft-max distribution is the same as the logistic sigmoid, when using $\theta = H_t(a) - H_t(b)$.

It is important to note that $\theta = H_t(a)$ when $H_t(b) = 0$. In this scenario, both functions return the same value for the same input.