IN3063 – Maths AI Report

Task 1:

1. **Sigmoid & ReLU:**

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* Reference:
  + <https://towardsdatascience.com/lets-code-a-neural-network-in-plain-numpy-ae7e74410795>
  + <https://www.sharpsightlabs.com/blog/numpy-relu/>
  + <https://www.educative.io/answers/sigmoid-vs-relu>
  + Lab 6
* Pros & Cons:
  + Sigmoid Pros:
    - Has the ability to map numbers to probabilities which is useful for binary classification
    - Output is bounded and prevents large/unstable outputs during training
  + Sigmoid Cons:
    - Has a gradient vanishing problem (occurs when gradient of loss function becomes very small during backpropagation)
    - Computationally expensive when dealing with a large dataset
  + ReLU Pros:
    - Avoids the gradient vanishing problem as it always has a constant gradient of 1 for all positive inputs – makes backpropagation easier
    - Power efficient – all values under 0 are discarded
  + ReLU Cons:
    - Weights can lead to negative inputs for a neuron which returns 0 – leading the neuron to be dead