**Final Project Analysis**

**Part 1: Classical Perceptron for the AND Problem**

* **Objective:** Evaluate the ability of a simple perceptron to solve the AND logic problem.
* **Observation:** Based on the decision boundary and model outputs, the perceptron successfully learned the correct behavior of the AND function.
* **Reason for Success:** The AND pattern is linearly separable, so a single-layer perceptron with a step activation function can effectively solve this problem.
* **Key Insight:** This model does **not** perform well on nonlinear patterns like XOR, highlighting the necessity of multilayer networks (MLPs) for more complex tasks.

**Part 2: Machine Learning Model Analysis on Medical Dataset**

**Objective:** Compare multiple machine learning models for predicting mortality in patients with heart failure.

**Conclusion:**

* If the classification\_report for **MLP with 200 neurons** yields the highest F1-score, it's likely the most suitable model for this task.
* **F1-score** is more important than accuracy in this context because medical data may be imbalanced and the cost of misclassification is high.
* **Decision Trees** offer fast performance but are less reliable for generalization unless carefully optimized.
* **Logistic Regression** is the simplest model, yet provides a strong baseline and performs respectably in many real-world scenarios.