A complex function involving 10 Boolean variables can be defined as:

$$f(x_1, x_2, \ldots, x_{10}) = (x_1 \oplus x_2) \wedge (x_3 \vee x_4) \oplus (x_5 \wedge x_6) \vee (x_7 \oplus x_8) \wedge (x_9 \oplus x_{10})$$

where:

- $\wedge$ represents the AND operation.
- $\vee$ represents the OR operation.
- $\oplus$ represents the XOR operation.

This function combines multiple logical operations to produce a complex decision boundary.

- Construct a decision table listing all possible input combinations and their corresponding outputs for the given Boolean function.
- Design an Artificial Neural Network (ANN) model with two hidden layers, each containing five nodes.
- Develop a detailed mathematical representation of the ANN, including weight transformations, activation functions, and forward propagation equations.
- Implement the ANN model from scratch in Python, incorporating weight initialization, forward propagation, backpropagation, and optimization techniques.