Random Seed Used: 2701

First test:

- Number of Iterations: 500
- Learning Rate: 0.1
- Number of Data Points: 20

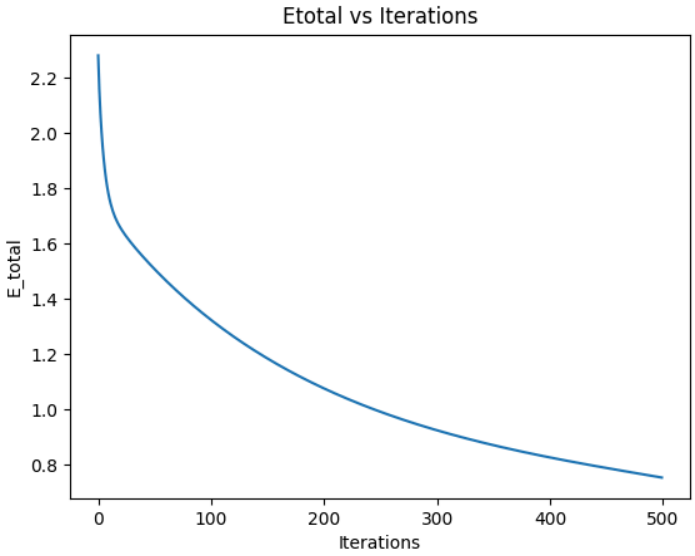
Results:

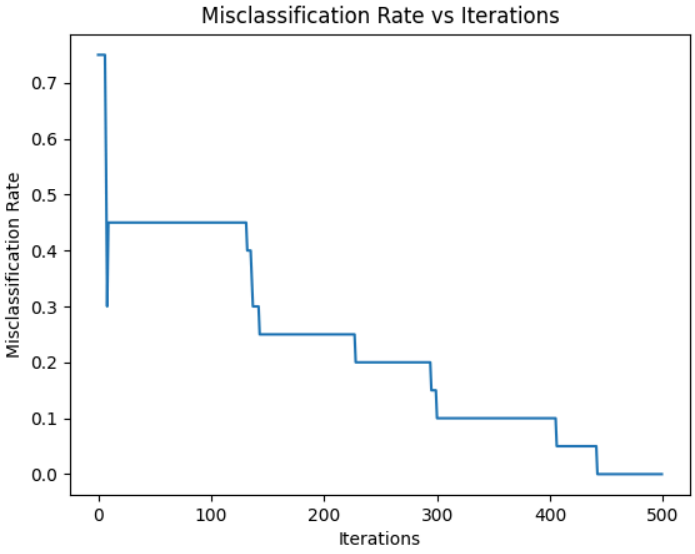
- See plots
- Accuracy: 0.931
- Confusion Matrix:
  [[12 0 0]
  [0 8 2]
  [0 0 7]]

Observations:

- Both the cross-entropy error and misclassification rate decrease smoothly over time.
- The drop in misclassification rate shows that the network is improving at classifying the data correctly.
- The cross-entropy error reduction aligns with the improved classification accuracy.

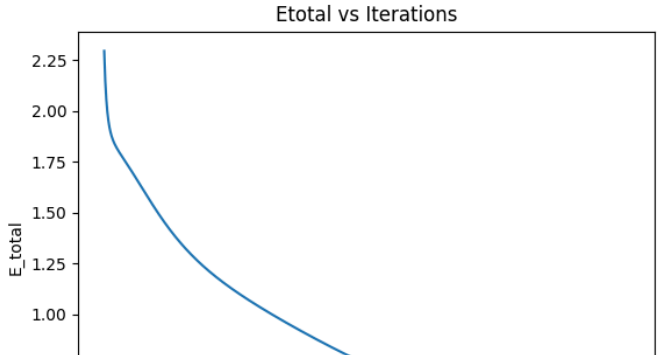
Summary:
The model is learning efficiently over time, with a clear reduction in both error and misclassification rate, indicating a well-functioning network after 500 iterations.





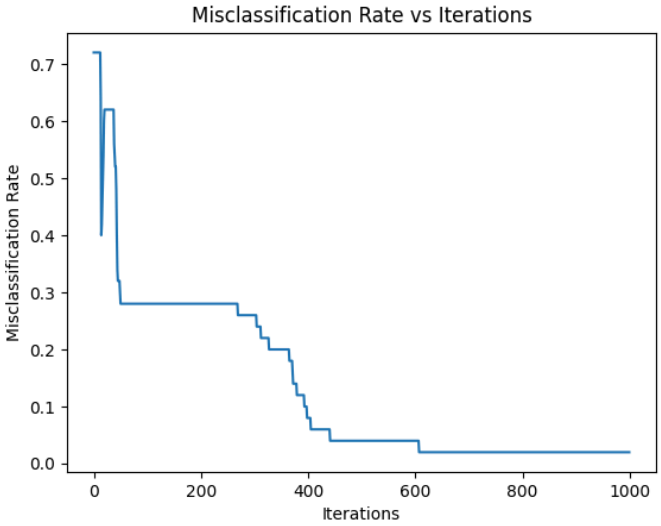
Second test, increasing the data points and iterations:

- Number of Iterations: 1000
- Number of Data Points: 50



Results:

- See plots
- Accuracy: 1.0
- Confusion Matrix:
  [[12 0 0]
  [0 10 0]
  [0 0 7]]



Observations:

- The extended training period (1000 iterations) allowed the model to fully optimize.
- The larger test set (50 data points) provided a more reliable evaluation of the model's performance.
- In contrast, the 500 iterations and 20 data points configuration resulted in lower accuracy (0.93), likely due to insufficient training time and a smaller, less representative test set.

Takeaways:

- Increasing iterations generally improves accuracy by allowing the model more time to optimize.
- Test data size and representativeness are critical for evaluating performance—larger test sets provide more reliable accuracy measures.
- In this case, 1000 iterations and 50 test points gave a more robust model with 100% accuracy, while 500 iterations and 20 data points resulted in 93% accuracy.