ICS 352 Lab 9 – The Perceptron
Peyton Hall
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Question 1:
The perceptron learning rule updates weights by calculating the difference between the predicted and actual class labels for each training example and adjusting the weights proportionally to that difference. The update rule is:

w = w + learning_rate * (y_true - y_pred) * x

This rule assumes that the data is linearly separable. For non-linearly separable data, the algorithm fails to converge because no single linear decision boundary can perfectly separate the classes. As a result, it continues updating weights indefinitely or until it hits the epoch limit without reaching 100% accuracy.

Question 2:
Learning rate (lr) and number of epochs (n_epochs) both affect performance. A higher learning rate speeds up training but may overshoot optimal weights and fail to converge. A lower learning rate improves precision but requires more epochs. More epochs give the model more time to learn, but too many can waste computation if the model has already converged. Experimenting with these parameters helps find a good balance between speed and accuracy.