In [44]:
```
import numpy as np
```

In [58]:
```
class Perceptron:
    def __init__(self, input_size, learning_rate=0.1):
        self.weights = np.random.randn(input_size)
        self.bias = np.random.randn()
        self.learning_rate = learning_rate

    def activation(self, x):#step function
        # define the step function as the activation function
        if(x > 0):
            return 1
        else:
            return 0

    def predict(self, inputs):
        # compute the weighted sum of inputs and bias
        z = np.dot(inputs, self.weights) + self.bias
        # apply the activation function
        a = self.activation(z)
        return a

    def train(self, training_inputs, labels, epochs):
        # loop for the given number of epochs
        for e in range(epochs):
        # loop for each data point
            for inputs, label in zip(training_inputs, labels):
                # get the prediction
                prediction = self.predict(inputs)
                # compute the error
                error = (label - prediction) ##loss function
                # update the weights and bias
                self.weights += self.learning_rate * error * inputs
                self.bias += self.learning_rate * error
                # print the error and the weights
                print(f"Epoch {e+1}, Error {error}, Weights {self.weights},
```

In [66]:
```
# create a perceptron with two inputs
p = Perceptron(2)
# define the training data for the or function
training_inputs = []
training_inputs.append(np.array([0, 0]))
training_inputs.append(np.array([0, 1]))
training_inputs.append(np.array([1, 0]))
training_inputs.append(np.array([1, 1]))
labels = np.array([0, 1, 1, 1])
# train the perceptron for 10 epochs
p.train(training_inputs, labels, 20)
# test the perceptron with new inputs
inputs = np.array([0, 0])
print(p.predict(inputs)) # expected output: 0
```

```
inputs = np.array([1, 1])
print(p.predict(inputs)) # expected output: 1

inputs = np.array([0.5, 0.5])
print(p.predict(inputs)) # expected output: 1

inputs = np.array([1, 0])
print(p.predict(inputs)) # expected output: 1
```

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Epoch 1, Error 0, Weights [-0.93082067 -0.27747705], Bias -0.946252263209169
8
Epoch 1, Error 1, Weights [-0.93082067 -0.17747705], Bias -0.846252263209169
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Epoch 1, Error 1, Weights [-0.83082067 -0.17747705], Bias -0.746252263209169
8
Epoch 1, Error 1, Weights [-0.73082067 -0.07747705], Bias -0.646252263209169
8
Epoch 2, Error 0, Weights [-0.73082067 -0.07747705], Bias -0.646252263209169
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Epoch 2, Error 1, Weights [-0.73082067  0.02252295], Bias -0.546252263209169
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Epoch 2, Error 1, Weights [-0.63082067  0.02252295], Bias -0.446252263209169
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Epoch 3, Error 0, Weights [-0.53082067  0.12252295], Bias -0.346252263209169
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Epoch 3, Error 1, Weights [-0.53082067  0.22252295], Bias -0.246252263209169
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Epoch 3, Error 1, Weights [-0.43082067  0.22252295], Bias -0.146252263209169
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Epoch 3, Error 1, Weights [-0.33082067  0.32252295], Bias -0.046252263209169
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Epoch 4, Error 0, Weights [-0.33082067  0.32252295], Bias -0.046252263209169
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Epoch 4, Error 0, Weights [-0.33082067  0.32252295], Bias -0.046252263209169
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Epoch 5, Error -1, Weights [-0.23082067  0.32252295], Bias -0.04625226320916
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Epoch 6, Error 0, Weights [-0.03082067  0.32252295], Bias 0.0537477367908301
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Epoch 7, Error -1, Weights [-0.03082067  0.32252295], Bias -0.04625226320916
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Epoch 7, Error 0, Weights [-0.03082067  0.32252295], Bias -0.046252263209169
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Epoch 7, Error 0, Weights [0.06917933 0.32252295], Bias 0.053747736790830114
Epoch 8, Error -1, Weights [0.06917933 0.32252295], Bias -0.0462522632091698
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Epoch 8, Error 0, Weights [0.06917933 0.32252295], Bias -0.0462522632091698 9
Epoch 8, Error 0, Weights [0.06917933 0.32252295], Bias -0.0462522632091698 9
Epoch 8, Error 0, Weights [0.06917933 0.32252295], Bias -0.0462522632091698 9
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Epoch 10, Error 0, Weights [0.06917933 0.32252295], Bias -0.0462522632091698
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Epoch 16, Error 0, Weights [0.06917933 0.32252295], Bias -0.0462522632091698
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In [ ]:

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