3.

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

prop\_class\_1 = np.arange(0, 1.001, 0.001)

prop\_class\_2 = 1 - prop\_class\_1

classification\_error = 1 - np.maximum(prop\_class\_1, prop\_class\_2)

gini = prop\_class\_1\*(1-prop\_class\_1) + prop\_class\_2\*(1-prop\_class\_2)

entropy = -prop\_class\_1\*np.log(prop\_class\_1) - prop\_class\_2\*np.log(prop\_class\_2)

df = pd.DataFrame({'prop\_class\_1': prop\_class\_1,

'prop\_class\_2': prop\_class\_2,

'classification\_error': classification\_error,

'gini': gini,

'entropy': entropy})

df = pd.melt(df, id\_vars=['prop\_class\_1', 'prop\_class\_2'],

value\_vars=['classification\_error', 'gini', 'entropy'],

var\_name='metric', value\_name='value')

plt.plot('prop\_class\_1', 'value', data=df[df['metric'] == 'classification\_error'], label='Classification Error')

plt.plot('prop\_class\_1', 'value', data=df[df['metric'] == 'gini'], label='Gini')

plt.plot('prop\_class\_1', 'value', data=df[df['metric'] == 'entropy'], label='Entropy')

plt.xlabel('Proportion (of class \'1\')')

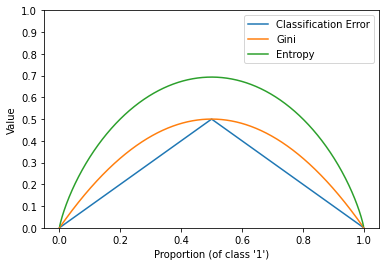
plt.ylabel('Value')

plt.ylim(0,1)

plt.yticks(np.arange(0,1.1,0.1))

plt.legend()

plt.show()



4.

