第一题

import matplotlib.pyplot as plt  
from sklearn.metrics import precision\_recall\_curve, roc\_curve, auc  
Y\_true = [1, 1, 1, 1, 1, 1, 1, 1, 0, 0]  
Y\_score = [0.90, 0.40, 0.20, 0.60, 0.50, 0.40, 0.70, 0.40, 0.65, 0.35]  
precision, recall, \_ = precision\_recall\_curve(Y\_true, Y\_score)  
pr\_auc = auc(recall, precision)  
fpr, tpr, \_ = roc\_curve(Y\_true, Y\_score)  
roc\_auc = auc(fpr, tpr)  
plt.figure(figsize=(8, 6))  
plt.plot(recall, precision, color='b', label=f'PR曲线 (AUC = {pr\_auc:.2f})')  
plt.xlabel('Recall')  
plt.ylabel('Precision')  
plt.title('Precision-Recall Curve')  
plt.legend(loc='lower left')  
plt.grid(True)  
plt.figure(figsize=(8, 6))  
plt.plot(fpr, tpr, color='r', label=f'ROC曲线 (AUC = {roc\_auc:.2f})')  
plt.plot([0, 1], [0, 1], linestyle='--', color='gray', label='Random Guess')  
plt.xlabel('False Positive Rate')  
plt.ylabel('True Positive Rate')  
plt.title('Receiver Operating Characteristic (ROC) Curve')  
plt.legend(loc='lower right')  
plt.grid(True)  
plt.show()

第二题

import numpy as np  
import matplotlib.pyplot as plt  
from sklearn.metrics import roc\_curve, auc  
Y\_true = np.array(  
 [[0, 0, 1], [0, 1, 0], [1, 0, 0], [0, 0, 1], [1, 0, 0], [0, 1, 0], [0, 1, 0], [0, 1, 0], [0, 0, 1], [0, 1, 0]])  
Y\_score = np.array([  
 [0.1, 0.2, 0.7],  
 [0.1, 0.6, 0.3],  
 [0.5, 0.2, 0.3],  
 [0.1, 0.1, 0.8],  
 [0.4, 0.2, 0.4],  
 [0.6, 0.3, 0.1],  
 [0.4, 0.2, 0.4],  
 [0.4, 0.1, 0.5],  
 [0.1, 0.1, 0.8],  
 [0.1, 0.8, 0.1]  
])  
fpr = dict()  
tpr = dict()  
roc\_auc = dict()  
for i in range(Y\_score.shape[1]):  
 fpr[i], tpr[i], \_ = roc\_curve(Y\_true[:, i], Y\_score[:, i])  
 roc\_auc[i] = auc(fpr[i], tpr[i])  
plt.figure(figsize=(8, 6))  
colors = ['aqua', 'darkorange', 'cornflowerblue']  
for i, color in zip(range(Y\_score.shape[1]), colors):  
 plt.plot(fpr[i], tpr[i], color=color, lw=2,  
 label=f'Class {i} ROC curve (AUC = {roc\_auc[i]:.2f})')  
plt.plot([0, 1], [0, 1], 'k--', lw=2)  
plt.xlim([0.0, 1.0])  
plt.ylim([0.0, 1.05])  
plt.xlabel('False Positive Rate')  
plt.ylabel('True Positive Rate')  
plt.title('ROC Curve for Each Class')  
plt.legend(loc="lower right")  
plt.show()