```python
import matplotlib.pyplot as plt
import numpy as np
from sklearn.metrics import auc, roc_curve

y_true = np.asarray(
    [[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_pred = np.asarray(
    [[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]])

# task 1
n_classes = len(y_true[1, :])
fpr = dict()
tpr = dict()
roc_auc = dict()

for i in range(n_classes):
    fpr[i], tpr[i], th = roc_curve(y_true[:, i], y_pred[:, i])
    roc_auc[i] = auc(fpr[i], tpr[i])

    plt.figure(figsize=(5, 5))
    plt.plot(fpr[i], tpr[i], linestyle='-')
    plt.plot(fpr[i], tpr[i], 'ro')
    plt.title(f'ROC curve {i + 1}', fontsize=14)
    plt.ylabel('TPR', fontsize=14)
    plt.xlabel('FPR', fontsize=14)
    plt.show()

    print("auc for class %d: %.2f" % (i+1, roc_auc[i]))
```
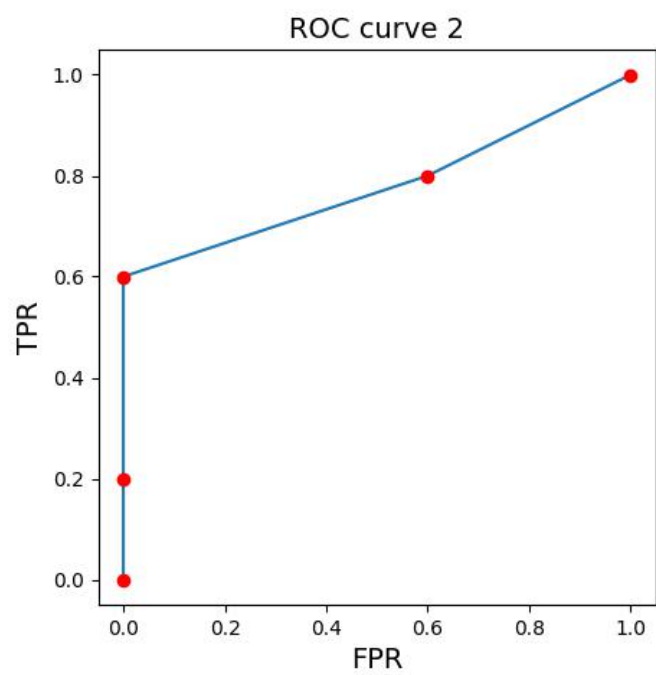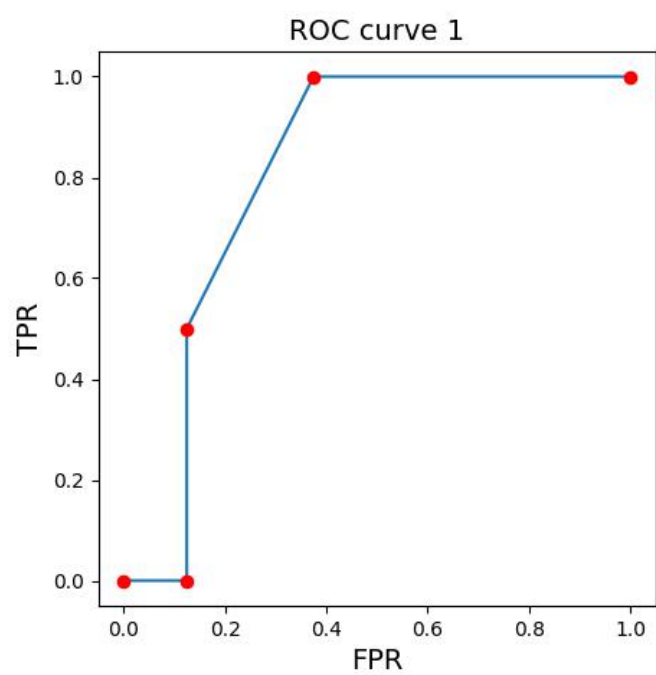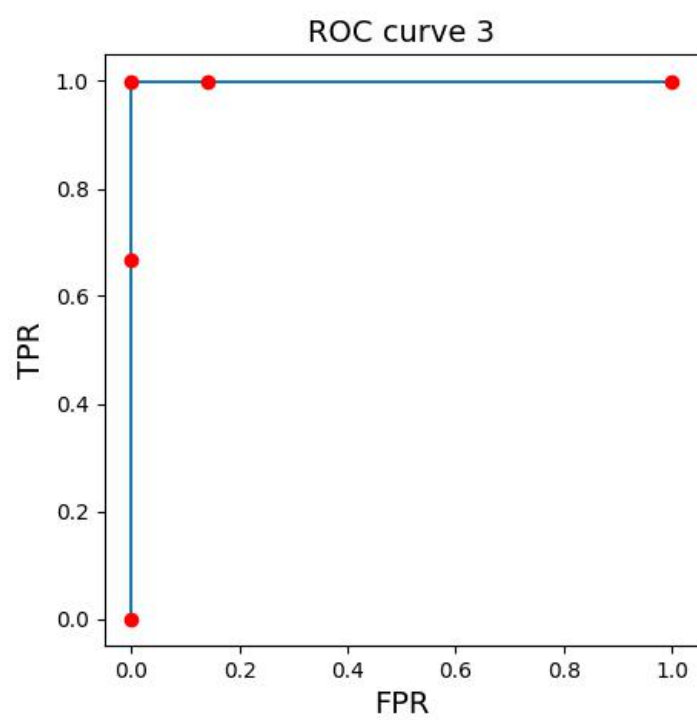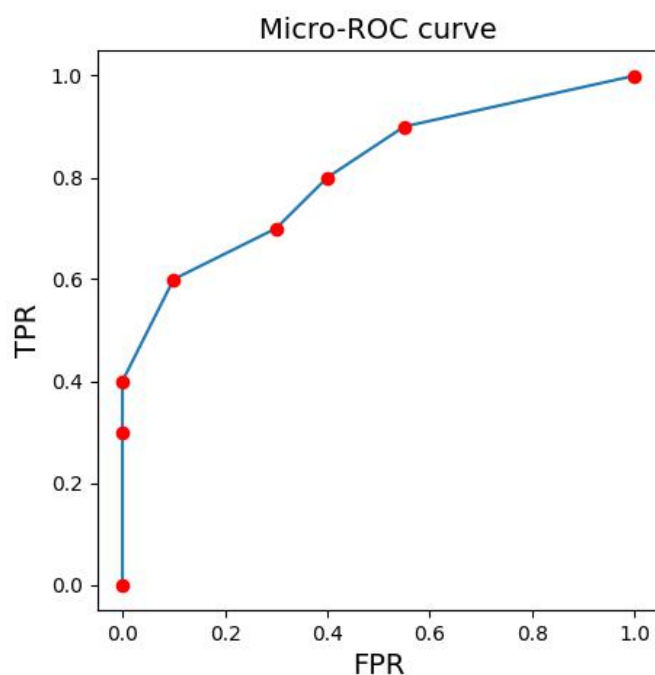
ROC curve 1

ROC curve 2

ROC curve 3

```
auc for class 1: 0.81
auc for class 2: 0.78
auc for class 3: 1.00
```

```
# task 2 Micro-ROC curve
total_true = [item for sublist in y_true for item in sublist]
total_pred = [item for sublist in y_pred for item in sublist]

micro_fpr, micro_tpr, th = roc_curve(total_true, total_pred)
micro_roc_auc = auc(micro_fpr, micro_tpr)

plt.figure(figsize=(5, 5))
plt.plot(micro_fpr, micro_tpr, linestyle='-')
plt.plot(micro_fpr, micro_tpr, 'ro')
plt.title('Micro-ROC curve', fontsize=14)
plt.ylabel('TPR', fontsize=14)
plt.xlabel('FPR', fontsize=14)
plt.show()

print("micro-auc: %.2f" % micro_roc_auc)
```



```
micro-auc: 0.81
```