

Firs Exercice :

```
import numpy as np
import matplotlib.pyplot as plt

x = np.linspace(0, 2*np.pi, 100)
y1 = np.sin(x)
y2 = np.cos(x)

plt.plot(x, y1, label='sin(x)', linestyle='--', color='blue')
plt.plot(x, y2, label='cos(x)', linestyle='-.', color='red')

plt.fill_between(x, y1, y2, where=(y1 > y2), color='gray', alpha=0.5)

plt.legend()
plt.xlabel('x')
plt.ylabel('y')
plt.title('Sin(x) and Cos(x) between 0 and 2pi with hatched pattern')
plt.grid(True)

plt.show()
```

Second Exercice :

```
import numpy as np
from collections import Counter

student_id = 400121045
np.random.seed(student_id)

vector = np.random.randint(0, 21, size=10000)

count = Counter(vector)

for number in range(21):
    print(f"Number {number}: {count[number]}")
```

Third Exercise :

```
import numpy as np

from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image

# فرض می‌کنیم مدل آموزش دیده شده قبلاً ذخیره شده است
model = load_model('path_to_your_saved_model.h5')

def test_images(model, test_images_dir):
    correct_predictions = 0
    total_predictions = 0

    # لیستی از مسیرهای تصاویر آزمایشی
    test_images_paths = [test_images_dir + f'/image_{i}.jpg' for i in range(1,
101)]

    for img_path in test_images_paths:
        img = image.load_img(img_path, target_size=(224, 224))
        img_array = image.img_to_array(img)
        img_array = np.expand_dims(img_array, axis=0)
        img_array /= 255.0

        prediction = model.predict(img_array)
        if prediction[0][0] > 0.5:
            print(f'{img_path} is a dog')
        else:
            print(f'{img_path} is a cat')

        # اینجا باید منطق تشخیص صحیح را بر اساس برچسب‌های واقعی اضافه کنید
        # if (prediction is correct according to the true label):
        #     correct_predictions += 1
        total_predictions += 1

    accuracy = (correct_predictions / total_predictions) * 100
    print(f'Accuracy: {accuracy}%',)

# مسیر پوشه حاوی تصاویر آزمایشی را اینجا قرار دهید
test_images_dir = 'path_to_your_test_images_folder'
test_images(model, test_images_dir)
```

Fourth Exersice :

```
import numpy as np

import pandas as pd
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score

iris = load_iris()
X = iris.data
y = iris.target

X = X[y != 2]
y = y[y != 2]

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,
random_state=42)

model = LogisticRegression()
model.fit(X_train, y_train)

y_pred = model.predict(X_test)

accuracy = accuracy_score(y_test, y_pred)

print(f"Accuracy: {accuracy}")
```