Lösungen 11
# Datenvisualisierung

1. Matplot-Grundlagen

```python
## a
from matplotlib import pyplot as plt
import math

x = [i*6*math.pi/300.0 for i in range(301)]
y1 = [math.sin(i) for i in x]
y2 = [math.cos(i) for i in x]
plt.plot(x,y1)
plt.plot(x,y2)

## b
import numpy as np
from matplotlib import pyplot as plt

x = np.linspace(0,6*np.pi,300)
y1 = np.sin(x)
y2 = np.cos(x)
plt.figure()
plt.plot(x,y1)
plt.plot(x,y2)

## c
plt.figure()
plt.plot(x,y1, label="sin(x)")
plt.plot(x,y2, label="cos(x)")
plt.axhline(y=0.0, c='g', ls='--')
plt.legend()
```
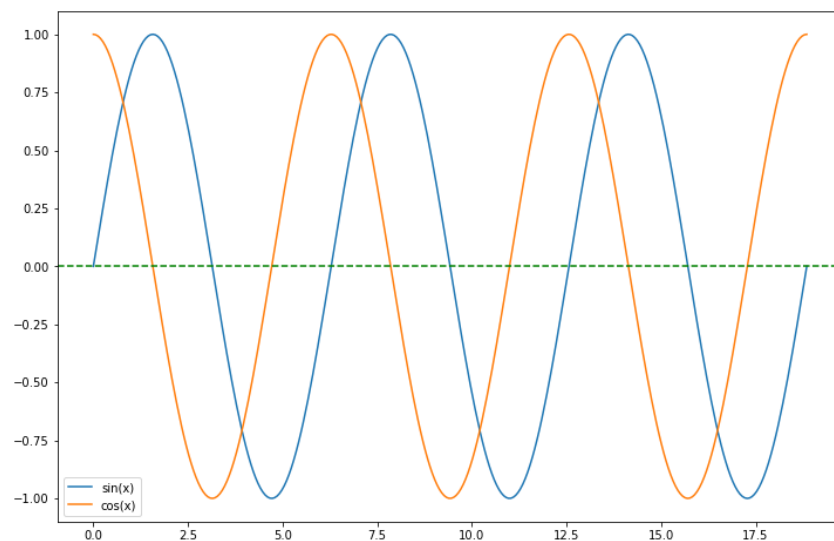
2. Statistische Plots

```python
import numpy as np
from matplotlib import pyplot as plt

## a
data = np.random.randn(2,5000)
data2 = np.random.rand(5000) * 3

print(data[0].shape, data[0].dtype)

plt.hist(data[0], 20)
plt.figure()
plt.hist(data[1], 20)
plt.figure()
plt.hist(data2, 20)

## b
plt.figure()
plt.boxplot((data[0], data[1], data2))
plt.savefig("boxplot.png", dpi=200, bbox_inches="tight")

## c (Zusatz)
x = np.arange(0,5000)

plt.figure(figsize=(12,8))
plt.scatter(x,data[0],s=5)
plt.scatter(x,data[1], s=5)
plt.scatter(x,data2, s=5)

## d (Zusatz)
fig,axs = plt.subplots(1,3, figsize=(20,8))
axs[0].hist(data[0], 20)
axs[1].hist(data[1], 20)
axs[2].hist(data2, 20)
```
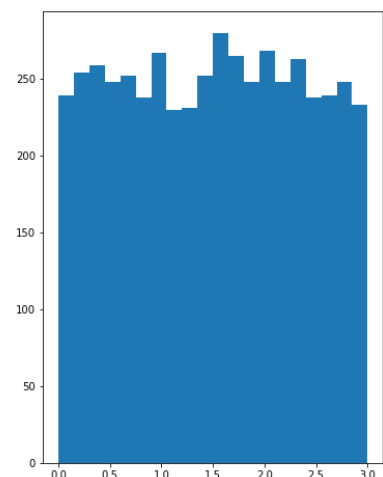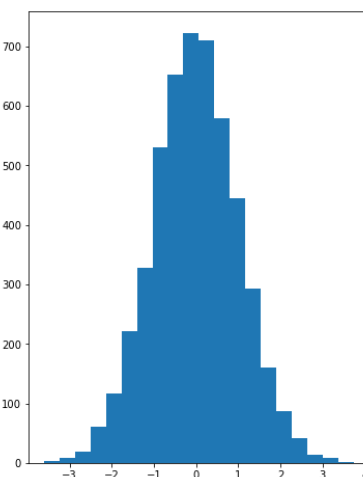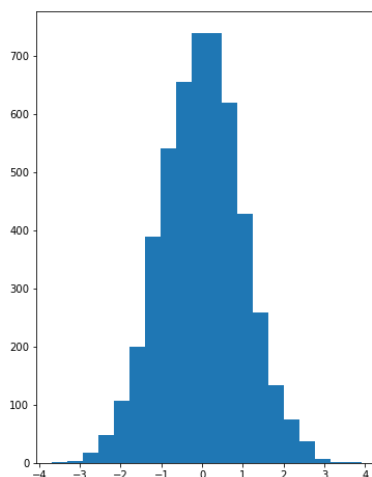
3. Pandas

```python
## Nur zum Test
f = open("erdbeben.csv", "r")
for i in range(3):
    print( f.readline(), end="" )
f.close()

## b

import pandas as pd
from matplotlib import pyplot as plt

data = pd.read_csv("erdbeben.csv", delimiter="|", header=None)

data.columns = ['Date','Lat','Lon','Depth','Mag','Loc']
new = pd.DataFrame([["2023-01-15", 50.01, 13.1, 2.5, 4.2,
"Germany"]], columns=data.columns)
data = pd.concat([data,new], ignore_index=True)
print(data)

## c
#plt.scatter(data['Lon'],data['Lat'])

plt.figure(figsize=(8,5))
data.plot.scatter(x="Lon", y="Lat",color="Mag")

plt.figure()
data.boxplot("Mag")

## d (Zusatz)
fig,axs = plt.subplots(1, 2)
data.boxplot("Depth", ax=axs[0])
data.boxplot("Mag", ax=axs[1])

## e (Zusatz)
data.plot.scatter(x="Lon",
y="Lat",color="Mag",sharex=False,cmap="rainbow")
plt.grid()
plt.title("Erdbeben")
data.to_csv("erdbeben2.csv")
data.to_html("erdbeben2.html")
```