

머신 러닝1

take home exam_ 과제2

과 목	머신러닝1
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교재215p-216p code text 및 결과

```

ans.dtypes
dataset    object
x          float64
y          float64
dtype: object

ans.describe()
count    44.000000    44.000000
mean      9.000000    7.500682
std       3.198837    1.958925
min       4.000000    3.100000
25%       7.000000    6.117500
50%       8.000000    7.520000
75%      11.000000    8.747500
max      19.000000   12.740000

ans.groupby(['dataset']).describe()
dataset    x      mean      std      min      25%      ...      y      25%      50%      75%      max
I          11.0    9.0    3.316625    4.0    6.5      ...    4.26    6.315    7.58    8.57    10.84
II         11.0    9.0    3.316625    4.0    6.5      ...    3.10    6.695    8.14    8.95    9.26
III        11.0    9.0    3.316625    4.0    6.5      ...    5.39    6.250    7.11    7.98    12.74
IV         11.0    9.0    3.316625    8.0    8.0      ...    5.25    6.170    7.04    8.19    12.50

[4 rows x 16 columns]

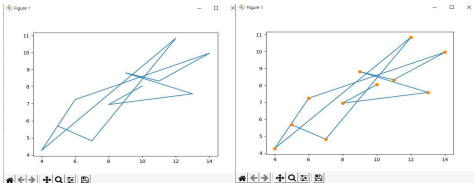
import seaborn as sns
import matplotlib as plt
ans = sns.load_dataset('anscombe')
ans.dtypes

```

```
import seaborn as sns
import matplotlib as plt
ans = sns.load_dataset('anscombe')
ans.dtypes
ans.describe()
ans.groupby(['dataset']).describe()
```

교재217p code text 및 결과

```
data1
dataset | x      y
0      | 10.0  8.04
1      |  8.0  6.95
2      | 13.0  7.58
3      |  9.0  8.81
4      | 11.0  8.33
5      | 14.0  9.96
6      |  6.0  7.24
7      |  4.0  4.26
8      | 12.0 10.84
9      |  7.0  4.82
10     |  5.0  5.68
```

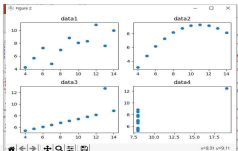
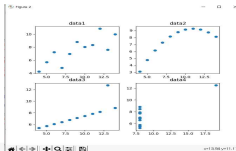
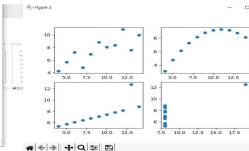
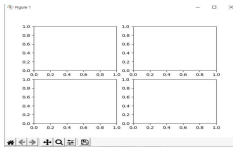


```
import seaborn as sns
import matplotlib.pyplot as plt
ans = sns.load_dataset('anscombe')
ans
ans.dtypes
ans.describe()
ans.groupby(['dataset']).describe()
```

```
data1 = ans[ans['dataset']=='I']
plt.plot(data1['x'],data1['y'])
plt.plot(data1['x'],data1['y'],'o')
```

```
plt.show()
```

교재218p~219p code text 및 결과



```
import seaborn as sns
import matplotlib.pyplot as plt
ans = sns.load_dataset('anscombe')
ans
ans.dtypes
ans.describe()
ans.groupby(['dataset']).describe()
```

```
data1 = ans[ans['dataset']=='I']
plt.plot(data1['x'],data1['y'])
plt.plot(data1['x'],data1['y'],'o')
```

```
data2 = ans[ans['dataset']=='II']
data3 = ans[ans['dataset']=='III']
data4 = ans[ans['dataset']=='IV']
```

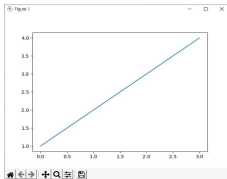
```
fig = plt.figure()
ax1 = fig.add_subplot(2,2,1)
ax2 = fig.add_subplot(2,2,2)
ax3 = fig.add_subplot(2,2,3)
ax4 = fig.add_subplot(2,2,4)
```

```
ax1.plot(data1['x'],data1['y'],'o' )
ax2.plot(data2['x'],data2['y'],'o' )
ax3.plot(data3['x'],data3['y'],'o' )
ax4.plot(data4['x'],data4['y'],'o' )
```

```
ax1.set_title('data1')
ax2.set_title('data2')
ax3.set_title('data3')
ax4.set_title('data4')
```

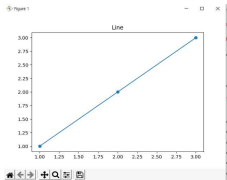
```
fig.tight_layout()
plt.show()
```

교재222p~226p code text 및 결과

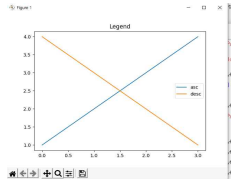


```
import matplotlib as mpl
import matplotlib.pyplot as plt

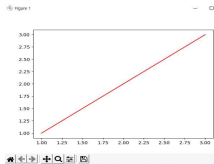
plt.plot([1,2,3,4])
plt.show()
```



```
import matplotlib as mpl
import matplotlib.pyplot as plt
plt.title('Line')
plt.plot([1,2,3],[1,2,3],marker='o')
plt.show()
```

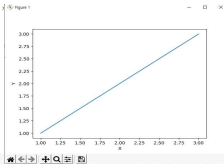


```
import matplotlib as mpl
import matplotlib.pyplot as plt
plt.title('Legend')
plt.plot([1,2,3,4],label='asc')
plt.plot([4,3,2,1],label='desc')
plt.legend()
plt.show()
```



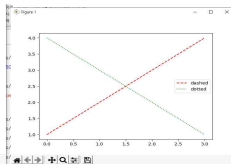
```
import matplotlib as mpl
import matplotlib.pyplot as plt

plt.plot([1,2,3],[1,2,3], color='red')
plt.show()
```



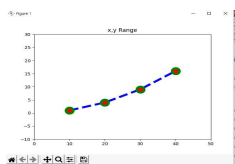
```
import matplotlib as mpl
import matplotlib.pyplot as plt

plt.plot([1,2,3],[1,2,3])
plt.xlabel("x")
plt.ylabel("y")
plt.show()
```



```
import matplotlib as mpl
import matplotlib.pyplot as plt

plt.plot([1,2,3,4],color='r',linestyle='--',label='dashed')
plt.plot([4,3,2,1],color='g',linestyle=':',label='dotted')
plt.legend()
plt.show()
```



```
import matplotlib as mpl
import matplotlib.pyplot as plt

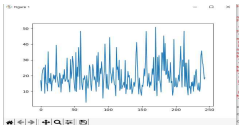
plt.title("x,y Range")
plt.plot([10, 20, 30, 40],[1, 4, 9, 16],
         c="b",lw=5,ls="--",marker='o',ms=15,mec="g",mew=5,mfc="r")
plt.xlim(0,50)
plt.ylim(-10,30)
plt.show()
```

교재227p~229p code text 및 결과

```
tips
total_bill  tip    sex smoker  day    time  size
0      16.99   1.01  Female   No   Sun  Dinner    2
1      10.34   1.66   Male   No   Sun  Dinner    3
2      21.01   3.50   Male   No   Sun  Dinner    3
3      23.68   3.31   Male   No   Sun  Dinner    2
4      24.59   3.61  Female   No   Sun  Dinner    4
...
239     29.08   5.92   Male   No   Sat  Dinner    3
240     27.18   2.00  Female   Yes  Sat  Dinner    2
241     22.67   2.00   Male   Yes  Sat  Dinner    2
242     17.82   1.75   Male   No   Sat  Dinner    2
243     18.78   3.00  Female   No  Thur  Dinner    2
```

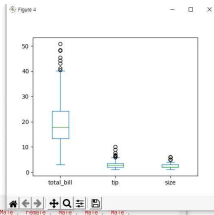
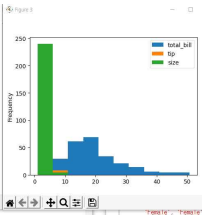
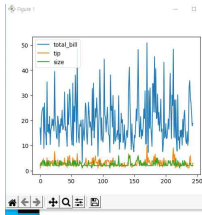
[244 rows x 7 columns]

```
import pandas as pd
import seaborn as sns
tips = sns.load_dataset("tips")
```



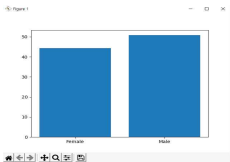
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
tips = sns.load_dataset("tips")
##tips.plot(kind='line')
##tips.plot(kind='hist')
##tips.plot(kind='box')
plt.plot(tips.total_bill)
plt.show()
```



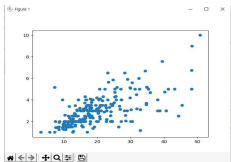
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips.plot(kind='line')
tips.plot(kind='hist')
tips.plot(kind='box')
plt.show()
```

교재230p~231p code text 및 결과



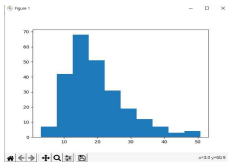
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
tips = sns.load_dataset("tips")
plt.bar(tips.sex, tips.total_bill)
plt.show()
```



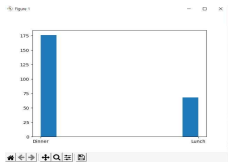
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
tips = sns.load_dataset("tips")
##plt.bar(tips.sex, tips.total_bill)
plt.scatter(tips.total_bill, tips.tip)
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
tips = sns.load_dataset("tips")
##plt.bar(tips.sex, tips.total_bill)
##plt.scatter(tips.total_bill, tips.tip)
plt.hist(tips.total_bill)
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
tips = sns.load_dataset("tips")
##plt.bar(tips.sex, tips.total_bill)
##plt.scatter(tips.total_bill, tips.tip)
##plt.hist(tips.total_bill)
plt.hist(tips.time)
plt.show()
```


교재233p~236p code text 및 결과

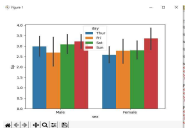
```
>>> tips
total_bill  tip    sex  smoker  day  time  size
0      16.99   1.01  Female    No   Sun  Dinner     2
1      10.34   1.66   Male     No   Sun  Dinner     2
2      21.01   3.50   Male     No   Sun  Dinner     2
3      23.68   3.31   Male     No   Sun  Dinner     4
4      24.59   3.61   Female   No   Sun  Dinner     4
...
239     29.03   5.92   Male     No   Sat  Dinner     3
240     27.18   2.00  Female   Yes   Sat  Dinner     2
241     22.67   2.00   Male     Yes   Sat  Dinner     2
242     17.82   1.75   Male     No   Sat  Dinner     2
243     18.78   3.00  Female   No   Thur Dinner     2
```

[244 rows x 7 columns]

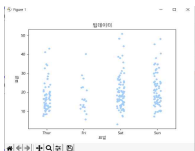
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
plt.rc('font',family='Malgun Gothic')
iris = sns.load_dataset("iris")
titanic = sns.load_dataset("titanic")
tips = sns.load_dataset("tips")
lights = sns.load_dataset("lights")
```

tips



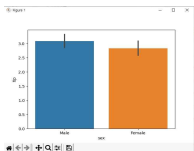
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",hue="day",data=tips)
plt.show()
```



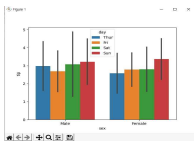
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
```

```
plt.rc('font',family='Malgun Gothic')
iris = sns.load_dataset("iris")
titanic = sns.load_dataset("titanic")
tips = sns.load_dataset("tips")
lights = sns.load_dataset("lights")
```

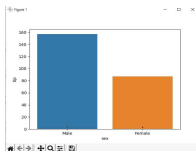
```
sns.set_palette("pastel")
sns.stripplot(x="day",y="total_bill",data=tips)
plt.title('팁데이터')
plt.ylabel("요금")
plt.xlabel("요일")
plt.show()
```



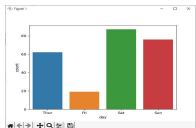
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",data=tips)
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",hue="day",data=tips,ci="sd")
plt.show()
```

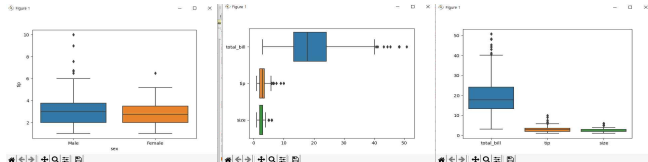


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",data=tips)
sns.barplot(x="sex",y="tip",estimator=len, data=tips)
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.countplot(x="day",data=tips)
plt.show()
```

교재238p~240p code text 및 결과



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(x="sex", y="tip", data=tips)
plt.show()
```

```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips, orient="h")
plt.show()
```

```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips)
plt.show()
```

```
tips.describe()

count    total_bill    tip    size
count    244.000000    244.000000    244.000000
mean      19.785343     2.998279     2.569672
std       8.902412     1.383638     0.951100
min       3.070000     1.000000     1.000000
25%      13.347500     2.000000     2.000000
50%      17.795000     2.900000     2.000000
75%      24.127500     3.562500     3.000000
max      50.810000    10.000000     6.000000
```

```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips)
tips.describe()
plt.show()
```

```
(tips["total_bill"] < 40) & (tips["tip"] < 8)

0      True
1      True
2      True
3      True
4      True
...
239    True
240    True
241    True
242    True
243    True
Length: 244, dtype: bool
```

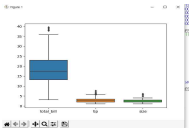
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips)
tips.describe()
(tips["total_bill"] < 40) & (tips["tip"] < 8)
plt.show()
```

```
newtips

total_bill  tip  sex  smoker  day  time  size
0      16.99  1.01  Female  No  Sun  Dinner    2
1      10.34  1.66  Male    No  Sun  Dinner    2
2      21.01  3.50  Male    No  Sun  Dinner    2
3      23.68  3.31  Male    No  Sun  Dinner    2
4      24.59  3.61  Female  No  Sun  Dinner    4
...
239     29.03  5.92  Male    No  Sat  Dinner    2
240     27.18  2.00  Female  Yes  Sat  Dinner    2
241     22.67  2.00  Male    Yes  Sat  Dinner    2
242     17.82  1.75  Male    No  Sat  Dinner    2
243     18.78  3.00  Female  No  Thur Dinner    2
```

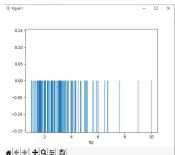
```
[234 rows x 7 columns]

import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips)
tips.describe()
(tips["total_bill"] < 40) & (tips["tip"] < 8)
newtips=tips[(tips["total_bill"]<40)&(tips["tip"]<8)]
plt.show()
```

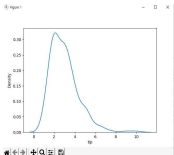


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips.describe()
(tips["total_bill"] < 40) & (tips["tip"] < 8)
newtips=tips[(tips["total_bill"]<40)&(tips["tip"]<8)]
sns.boxplot(data=newtips)
plt.show()
```

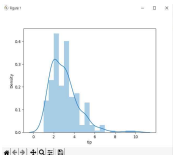
교재242p~245p code text 및 결과



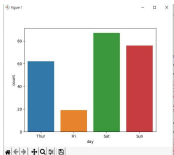
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.rugplot(tips.tip,height=0.5,axis='x')
plt.show()
```



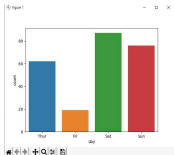
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.kdeplot(tips.tip)
plt.show()
```



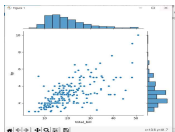
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.distplot(tips.tip)
plt.show()
```



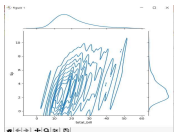
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.countplot(x="day",data=tips)
plt.show()
```



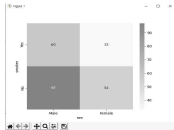
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.catplot('day',kind='count',data=tips)
plt.show()
```



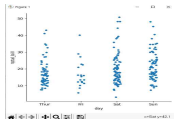
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.jointplot(x="total_bill",y="tip",data=tips)
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.jointplot(x="total_bill",y="tip",data=tips,kind="kde")
plt.show()
```

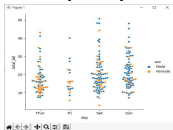


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.heatmap(tips_var,cmap=sns.light_palette("gray",as_cmap=True),annot=True,fmt="d")
plt.show()
```

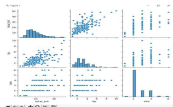


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.catplot(x="day",y="total_bill",data=tips);
plt.show()
```

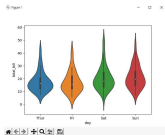
교재246p~248p code text 및 결과



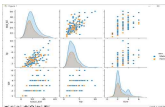
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.catplot(x="day",y="total_bill",hue="sex",kind="swarm",data=tips);
plt.show()
```



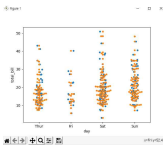
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.pairplot(tips)
plt.show()
```



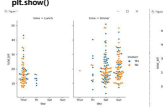
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.violinplot(x="day",y="total_bill",data=tips);
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.pairplot(tips,hue="sex")
plt.show()
```

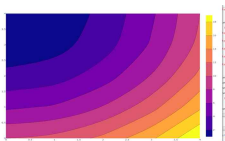
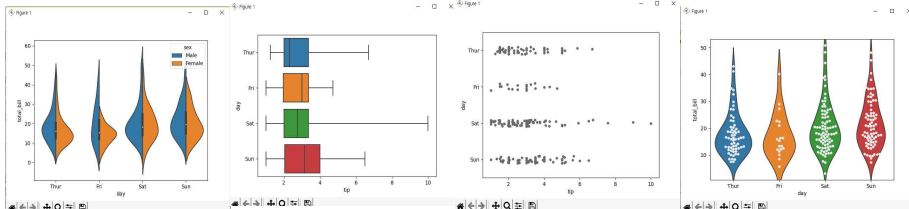


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.stripplot(x="day",y="total_bill",data=tips,jitter=True)
sns.swarmplot(x="day",y="total_bill",data=tips);
plt.show()
```



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
##sns.catplot(x="day",y="total_bill",hue="smoker",col="time",aspect=.6,kind="swarm",data=tips);
##sns.boxplot(x="day",y="total_bill",hue="sex",data=tips)
sns.stripplot(x="day",y="total_bill",hue="sex",data=tips,jitter=True)
plt.show()
```

교재249p~251p code text 및 결과



import plotly.graph_objects as go

```
fig = go.Figure(data =
    go.Contour(
        z=[[10, 10.625, 12.5, 15.625, 20],
          [5.625, 6.25, 8.125, 11.25, 15.625],
          [2.5, 3.125, 5., 8.125, 12.5],
          [0.625, 1.25, 3.125, 6.25, 10.625],
          [0, 0.625, 2.5, 5.625, 10]]
    ))
fig.show()
```

```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
##sns.violinplot(x="day",y="total_bill",hue="sex",data=tips,split=True)
##sns.boxplot(x="tip",y="day",data=tips,whis=np.inf)
#sns.stripplot(x="tip",y="day",data=tips,jitter=True,color="0.4")
sns.violinplot(x="day",y="total_bill",data=tips,inner=None)
sns.swarmplot(x="day",y="total_bill",data=tips,color="0.9")
plt.show()
```

교재258p~261p code text

```

0      date      value
1 1991-07-01  3.526991
2 1991-08-01  3.180991
3 1991-09-01  3.252221
4 1991-10-01  3.611003
5 1991-11-01  3.565869

199 2008-02-01 21.054205
200 2008-03-01 19.294945
201 2008-04-01 23.107677
202 2008-05-01 22.912510
203 2008-06-01 19.431740

[204 rows x 2 columns]
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 204 entries, 0 to 203
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  --
 0   date    204 non-null    object
 1   value   204 non-null    float64
dtypes: float64(1), object(1)
memory usage: 3.3+ KB

0      date      value  new_date
1 1991-07-01  3.526991 1991-07-01
2 1991-08-01  3.180991 1991-08-01
3 1991-09-01  3.252221 1991-09-01
4 1991-10-01  3.611003 1991-10-01
5 1991-11-01  3.565869 1991-11-01

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 204 entries, 0 to 203
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype
---  --
 0   date    204 non-null    object
 1   value   204 non-null    float64
 2   new_date 204 non-null    datetime64[ns]
dtypes: datetime64[ns](1), float64(1), object(1)
memory usage: 4.9+ KB

None

<class 'pandas._libs.tslibs.timestamps.Timestamp'>
new_date
1991-07-01  3.526991
1991-08-01  3.180991
1991-09-01  3.252221
1991-10-01  3.611003
1991-11-01  3.565869

<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 204 entries, 1991-07-01 to 2008-06-01
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype
---  --
 0   value   204 non-null    float64
dtypes: float64(1)
memory usage: 3.2 KB

None
>>> |

```

```

from dateutil.parser import parse
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
import pandas as pd
plt.rcParams.update({'figure.figsize': (10,7), 'figure.dpi': 120})
#판다스 라이브러리 불러오기
import pandas as pd
#파일 경로를 찾고 변수 파일 패치에 저장
file_path = 'C:/data/time_series.csv'
# read csv() 함수로 데이터프레임 변환
df=pd.read_csv(file_path)

```

print(df)

```

df.info()

df['new_date'] = pd.to_datetime(df['date'])
print(df.head())
print("\n")
print(df.info())
print("\n")
print(type(df['new_date'])[0])
df.drop('date',axis = 1, inplace=True)
df.set_index('new_date',inplace=True)
print(df.head())
print("\n")
print(df.info())

```

```

from dateutil.parser import parse
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
import pandas as pd
plt.rcParams.update({'figure.figsize': (10,7), 'figure.dpi': 120})

```

```

#draw plot
def plot_df(df,xy,title="",xlabel='Date',ylabel='Value',dpi=100):
    plt.figure(figsize=(16,5),dpi=dpi)
    plt.plot(x,y,color='tab:red')
    plt.gca().set(title=title,xlabel=xlabel,ylabel=ylabel)
    plt.show()

```

plot_df(df,x=df.index,y=df.value,title='Time series data')

```

#import data
df = pd.read_csv('c:/data/time_series.csv',parse_dates=['date'],
                index_col='date')
df.reset_index(inplace=True)
#prepare data
df['year'] = [d.year for d in df.date]
df['month'] = [d.strftime('%b') for d in df.date]
years = df['year'].unique()
#prep colors
np.random.seed(100)
mycolors = np.random.choice(list(mpl.colors.XKCD_COLORS.keys()), len(years),
                             replace=False)

```

```

#Draw plot
plt.figure(figsize=(16,12),dpi= 80)
for i, y in enumerate(years):
    if i > 0 :
        plt.plot('month', 'value', data = df.loc[df.year==y, :],
                color = mycolors[i], label=y)
        plt.text(df.loc[df.year==y, :].shape[0]-.9,ArithmeticError df.loc[df.year==y, 'value']
                [-1:].value[0], y, fontsize=12, color = mycolors[i])

```

```

#decoration
plt.gca().set(xlim=(-0.3, 11), ylim=(2,30), ylabel='$Drug Sales$', xlabel='$Month$')
plt.yticks(fontsize=12, alpha=.7)
plt.title("Time series data", fontsize = 20)
plt.show()

```

```

#import data
df = pd.read_csv('c:/data/time_series.csv',parse_dates=['date'],
                index_col='date')
df.reset_index(inplace=True)
#prepare data
df['year'] = [d.year for d in df.date]
df['month'] = [d.strftime('%b') for d in df.date]
years = df['year'].unique()
#draw plot
fig, axes = plt.subplots(1,2,figsize=(20,7),dpi = 80)
sns.boxplot(x='year',y='value',data=df ax=axes[0])
sns.boxplot(x='month',y='value',data=df.loc[~df.year.isin([1991,2008]), :])
#set title
axes[0].set_title('Year-wise Box Plot\n(The Trend)', fontsize=18);
axes[1].set_title('Month-wise Box Plot\n(The Seasonality)',fontsize=18)
plt.show()

```