머신 러닝1

take home exam_ 과제2

과 목	머신러닝1
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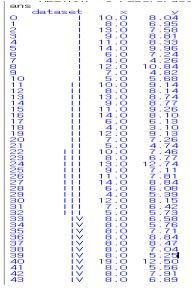
교재215p-216p code text 및 결과



```
ans
   dataset     x     y
0        I  10.0  8.04
1        I   8.0  6.95
2        I  13.0  7.58
3        I   9.0  8.81
4        I  11.0  8.33
5        I  14.0  9.96
6        I   6.0  7.24
7        I   4.0  4.26
8        I  12.0 10.84
9        I   7.0  4.82
10       I   5.0  5.68
11      II  10.0  9.14
12      II   8.0  8.14
13      II  13.0  8.74
14      II   9.0  8.77
15      II  11.0  9.26
16      II  14.0  8.10
17      II   6.0  6.13
18      II   4.0  3.10
19      II  12.0  9.13
20      II   7.0  7.26
21      II   5.0  4.74
22     III  10.0  7.46
23     III   8.0  6.77
24     III  13.0 12.74
25     III   9.0  7.11
26     III  11.0  7.81
27     III  14.0  8.84
28     III   6.0  6.08
29     III   4.0  5.39
30     III  12.0  8.15
31     III   7.0  6.42
32     III   5.0  5.73
33      IV   8.0  6.58
34      IV   8.0  5.76
35      IV   8.0  7.71
36      IV   8.0  8.84
37      IV   8.0  8.47
38      IV   8.0  7.04
39      IV   8.0  5.25
40      IV  19.0 12.50
41      IV   8.0  5.56
42      IV   8.0  7.91
43      IV   8.0  6.89
```

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

```
ans.describe()
                x           y
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
```

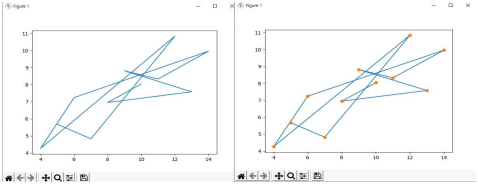
```
ans.groupby(['dataset']).describe()
             x                                                 ...     y
         count mean       std  min  25%  50%  75%  max      ...   min   25%   50%   75%    max
dataset                                                      ...
I         11.0  9.0  3.316625  4.0  6.5  7.0  8.5  14.0     ...  4.26  6.315  7.58  8.57  10.84
II        11.0  9.0  3.316625  4.0  6.5  7.0  8.5  14.0     ...  3.10  6.695  8.14  8.95   9.26
III       11.0  9.0  3.316625  4.0  6.5  7.0  8.5  14.0     ...  5.39  6.250  7.11  7.98  12.74
IV        11.0  9.0  3.316625  8.0  8.0  8.0  8.0  19.0     ...  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
ans.describe()
ans.groupby(['dataset']).describe()
```

교재217p code text 및 결과

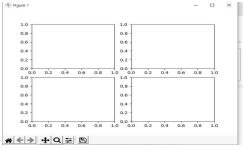
data1

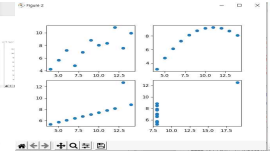
	dataset	x	y
0	I	10.0	8.04
1	I	8.0	6.95
2	I	13.0	7.58
3	I	9.0	8.81
4	I	11.0	8.33
5	I	14.0	9.96
6	I	6.0	7.24
7	I	4.0	4.26
8	I	12.0	10.84
9	I	7.0	4.82
10	I	5.0	5.68

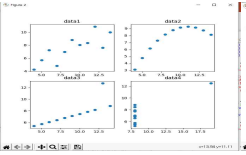


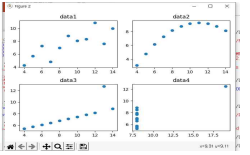
```
import seaborn as sns
import matplotlib.pyplot as plt
ans = sns.load_dataset('anscombe')
ans
ans.dtypes
ans.describe()
ans.groupby(['dataset']).describe()

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



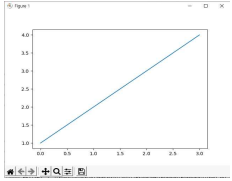




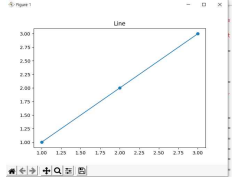



```
import seaborn as sns
import matplotlib.pyplot as plt
ans = sns.load_dataset('anscombe')
ans
ans.dtypes
ans.describe()
ans.groupby(['dataset']).describe()

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()
```

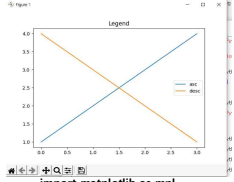
교재222p~226p code text 및 결과



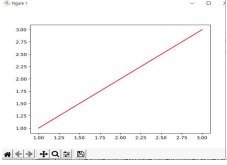
```
import matplotlib as mpl
import matplotlib.pyplot as plt

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



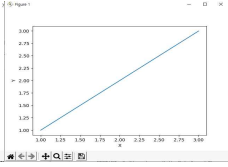

```
import matplotlib as mpl
import matplotlib.pyplot as plt
plt.title('Line')
plt.plot([1,2,3],[1,2,3],marker='o')
plt.show()
```



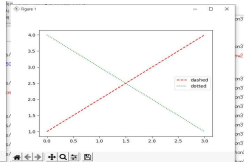

```
import matplotlib as mpl
import matplotlib.pyplot as plt
plt.title('Legend')
plt.plot([1,2,3,4],label='asc')
plt.plot([4,3,2,1],label='desc')
plt.legend()
plt.show()
```



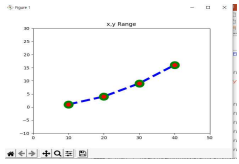
```
import matplotlib as mpl
import matplotlib.pyplot as plt

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()
```

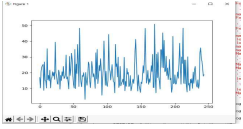



```
import matplotlib as mpl
import matplotlib.pyplot as plt

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()
```

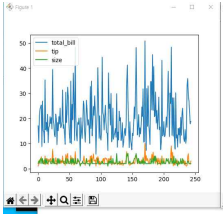
교재227p~229p code text 및 결과

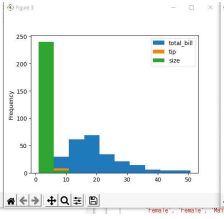
```
tips
     total_bill   tip     sex smoker  day    time  size
0         16.99  1.01  Female     No  Sun  Dinner     2
1         10.34  1.66    Male     No  Sun  Dinner     3
2         21.01  3.50    Male     No  Sun  Dinner     3
3         23.68  3.31    Male     No  Sun  Dinner     2
4         24.59  3.61  Female     No  Sun  Dinner     4
..          ...   ...     ...    ...  ...     ...   ...
239       29.03  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]
```

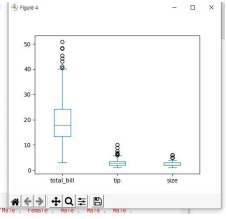
```
import pandas as pd
import seaborn as sns
tips = sns.load_dataset("tips")
```



```
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()
```

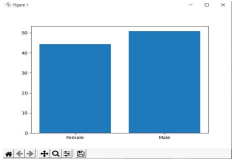




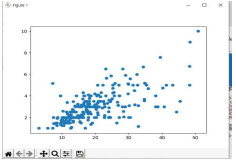



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips.plot(kind='line')
tips.plot(kind='hist')
tips.plot(kind='box')
plt.show()
```

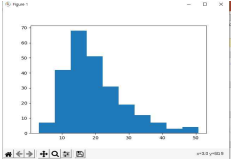
교재230p~231p code text 및 결과



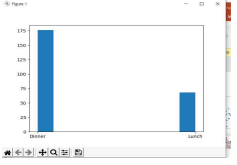

```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd

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()
```

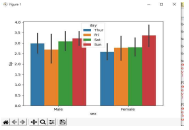



```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd

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()
```

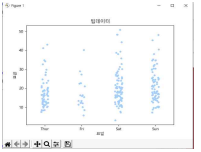
교재233p~236p code text 및 결과

```
>>> 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     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       29.03  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]
```

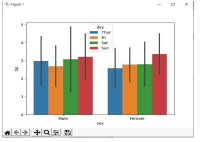
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd

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("flights")

tips
```



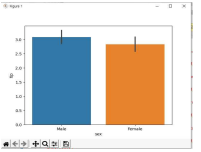
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",hue="day",data=tips)
plt.show()
```



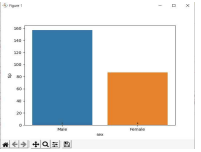
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd

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("flights")

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



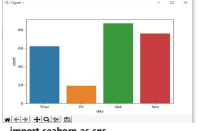
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",hue="day",data=tips,ci="sd")
plt.show()
```



```
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)
plt.show()
```

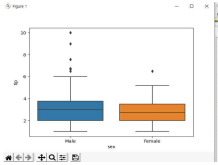


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.barplot(x="sex",y="tip",data=tips)
sns.barplot(x="sex",y="tip",estimator=len, data=tips)
plt.show()
```

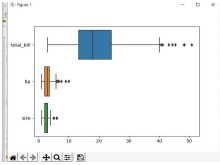


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.countplot(x = 'day',data = tips)
plt.show()
```

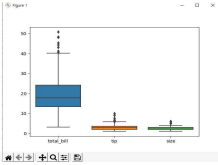
교재238p~240p code text 및 결과



```
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()
```

	total_bill	tip	size
count	244.000000	244.000000	244.000000
mean	19.785943	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
```

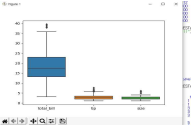
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.boxplot(data=tips)
tips.describe()
(tips["total_bill"] < 40) & (tips["tip"] < 8)
```

```
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	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	29.03	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

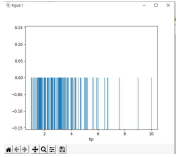
[234 rows x 7 columns]

```
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)]
sns.boxplot(data=newtips)
plt.show()
```

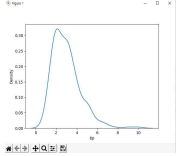


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips.describe()
(tips["total_bill"] < 40) & (tips["tip"] < 8)
newtips=tips[(tips["total_bill"]<40)&(tips["tip"]<8)]
sns.boxplot(data=newtips)
plt.show()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

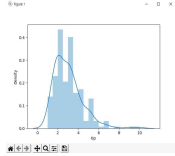
교재242p~245p code text 및 결과



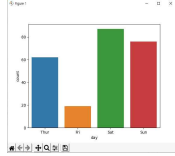
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.rugplot(tips.tip,height=0.5,axis='x')
plt.show()
```



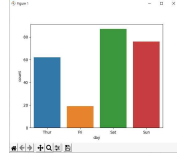
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.kdeplot(tips.tip)
plt.show()
```



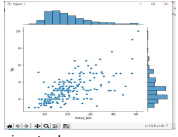
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.distplot(tips.tip)
plt.show()
```



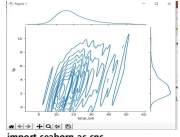
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.countplot(x="day",data=tips)
plt.show()
```



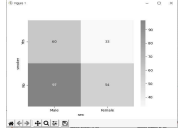
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.catplot('day',kind='count',data=tips)
plt.show()
```



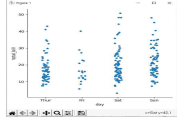
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
sns.jointplot(x="total_bill",y="tip",data=tips)
plt.show()
```



```
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()
```

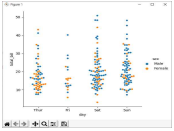


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.heatmap(tips_var,cmap=sns.light_palette("gray",as_cmap=True),annot=True,fmt="d")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

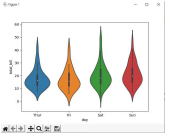


```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.catplot(x="day",y="total_bill",data=tips);
plt.show()
```

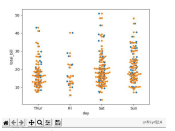
교재246p~248p code text 및 결과



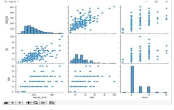
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.catplot(x="day",y="total_bill",hue="sex",kind="swarm",data=tips);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



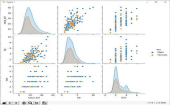
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.violinplot(x="day",y="total_bill",data=tips);
plt.show()
```



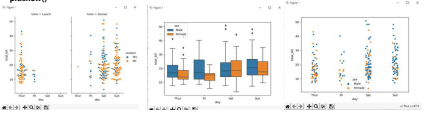
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.stripplot(x="day",y="total_bill",data=tips,jitter=True)
sns.swarmplot(x="day",y="total_bill",data=tips);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

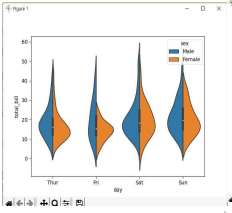


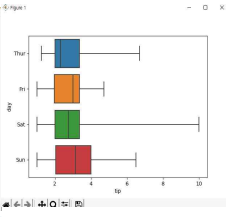
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
sns.pairplot(tips,hue="sex")
plt.show()
```

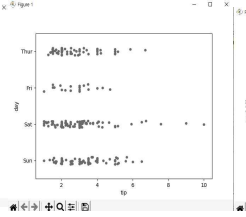


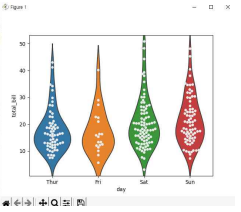
```
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
import numpy as np
import pandas as pd
tips = sns.load_dataset("tips")
tips_var=tips.pivot_table(index="smoker",columns="sex",aggfunc="size")
tips_var
##sns.catplot(x="day",y="total_bill",hue="smoker",col="time",aspect=.6,kind="swarm",data=tips);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

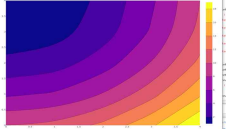
교재249p~251p code text 및 결과











```
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

```
                date     value
0         1991-07-01  3.526591
1         1991-08-01  3.180891
2         1991-09-01  3.252221
3         1991-10-01  3.611003
4         1991-11-01  3.565869
...              ...       ...
199       2008-02-01  21.654285
200       2008-03-01  18.264945
201       2008-04-01  23.803309
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
                date     value    new_date
0         1991-07-01  3.526591  1991-07-01
1         1991-08-01  3.180891  1991-08-01
2         1991-09-01  3.252221  1991-09-01
3         1991-10-01  3.611003  1991-10-01
4         1991-11-01  3.565869  1991-11-01
...              ...       ...         ...
199       2008-02-01  21.654285  2008-02-01
200       2008-03-01  18.264945  2008-03-01
201       2008-04-01  23.803309  2008-04-01
202       2008-05-01  22.912510  2008-05-01
203       2008-06-01  19.431740  2008-06-01

[204 rows x 3 columns]

<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'>
                value
new_date
1991-07-01  3.526591
1991-08-01  3.180891
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 패지에 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,x,y,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,Arithmeticℇrror 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()
```