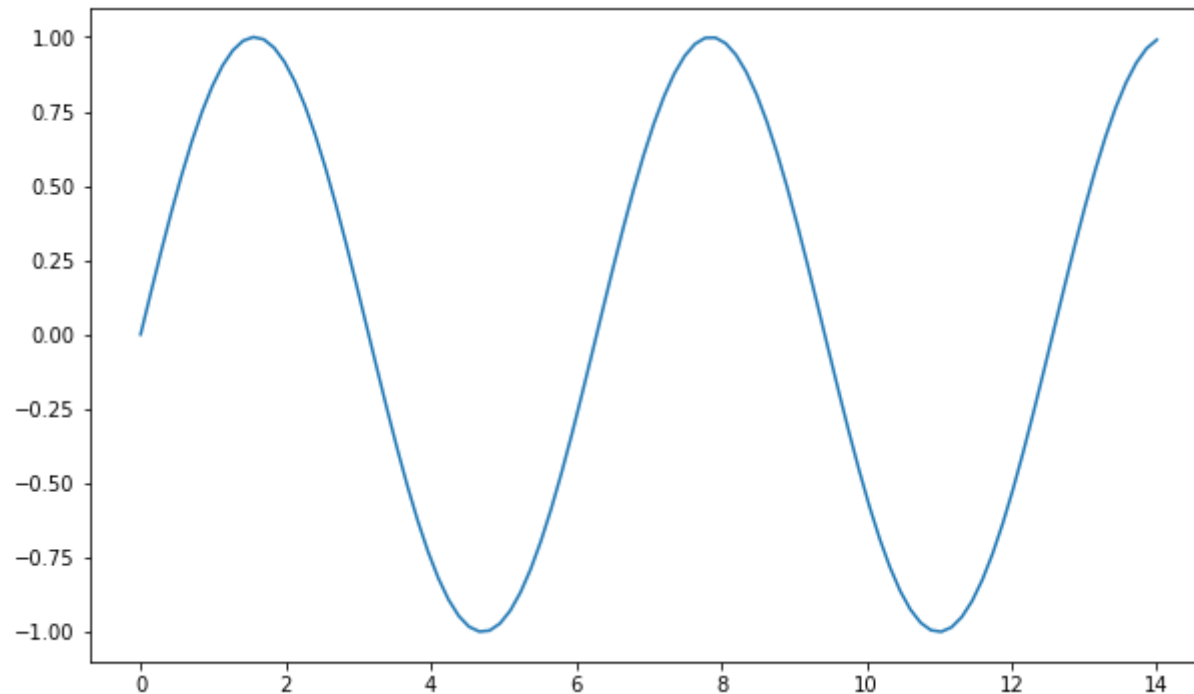


```
In [4]: import matplotlib.pyplot as plt  
import numpy as np
```

```
In [5]: %matplotlib inline  
  
import seaborn as sns
```

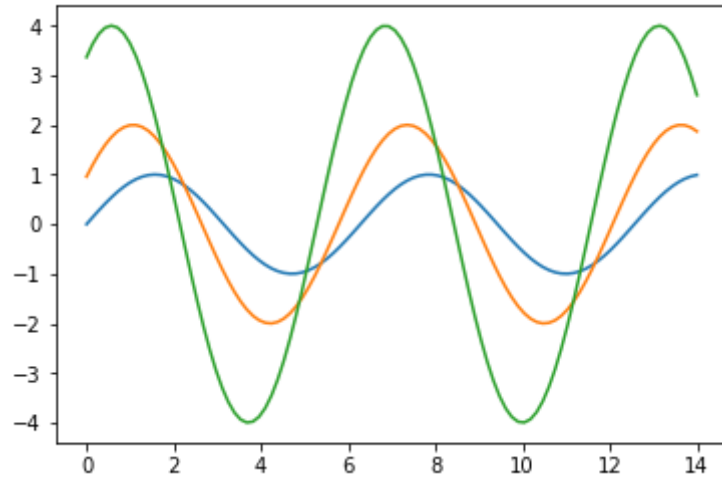
```
In [8]: x = np.linspace(0,14,100)  
y1 = np.sin(x)  
y2 = 2*np.sin(x+0.5)  
y3 = 4*np.sin(x+1.0)  
  
plt.figure(figsize=(10,6))  # 그림의 크기  
plt.plot(x, y1)
```

```
Out[8]: [<matplotlib.lines.Line2D at 0x2515e768898>]
```



```
In [10]: plt.plot(x, y1, x, y2, x, y3) # 3개의 sin 그래프
```

```
Out[10]: [<matplotlib.lines.Line2D at 0x2515e67ef60>,  
<matplotlib.lines.Line2D at 0x2515e68c160>,  
<matplotlib.lines.Line2D at 0x2515e68c978>]
```

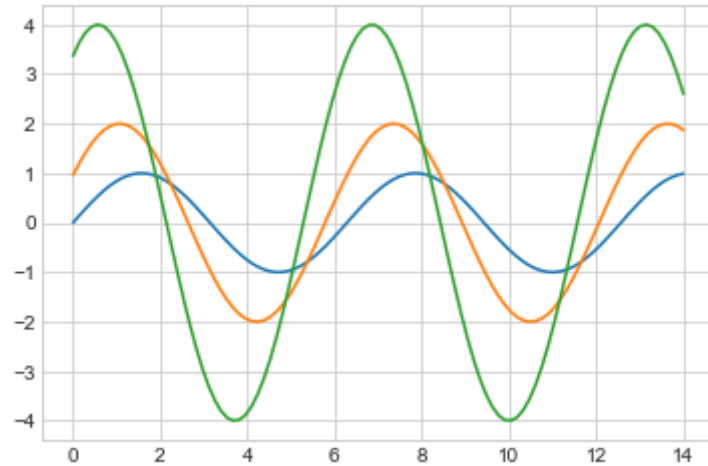


새로운 스타일 적용

```
In [11]: sns.set_style("whitegrid")
```

```
In [12]: plt.plot(x, y1, x, y2, x, y3) # 3개의 sin 그래프
```

```
Out[12]: [<matplotlib.lines.Line2D at 0x2515e778358>,  
<matplotlib.lines.Line2D at 0x2515e778550>,  
<matplotlib.lines.Line2D at 0x2515e778da0>]
```



tip 데이터로 데이터 살펴보고 인사이트 얻기

```
In [16]: sns.set_style("whitegrid")
```

```
In [18]: tips = sns.load_dataset("tips") # 인터넷이 켜져 있어야 함.  
tips
```

Out[18]:

| | 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 |
| 5 | 25.29 | 4.71 | Male | No | Sun | Dinner | 4 |
| 6 | 8.77 | 2.00 | Male | No | Sun | Dinner | 2 |
| 7 | 26.88 | 3.12 | Male | No | Sun | Dinner | 4 |
| 8 | 15.04 | 1.96 | Male | No | Sun | Dinner | 2 |
| 9 | 14.78 | 3.23 | Male | No | Sun | Dinner | 2 |
| 10 | 10.27 | 1.71 | Male | No | Sun | Dinner | 2 |
| 11 | 35.26 | 5.00 | Female | No | Sun | Dinner | 4 |
| 12 | 15.42 | 1.57 | Male | No | Sun | Dinner | 2 |
| 13 | 18.43 | 3.00 | Male | No | Sun | Dinner | 4 |
| 14 | 14.83 | 3.02 | Female | No | Sun | Dinner | 2 |
| 15 | 21.58 | 3.92 | Male | No | Sun | Dinner | 2 |
| 16 | 10.33 | 1.67 | Female | No | Sun | Dinner | 3 |
| 17 | 16.29 | 3.71 | Male | No | Sun | Dinner | 3 |
| 18 | 16.97 | 3.50 | Female | No | Sun | Dinner | 3 |
| 19 | 20.65 | 3.35 | Male | No | Sat | Dinner | 3 |
| 20 | 17.92 | 4.08 | Male | No | Sat | Dinner | 2 |
| 21 | 20.29 | 2.75 | Female | No | Sat | Dinner | 2 |
| 22 | 15.77 | 2.23 | Female | No | Sat | Dinner | 2 |

| | total_bill | tip | sex | smoker | day | time | size |
|-----|------------|------|--------|--------|-----|--------|------|
| 23 | 39.42 | 7.58 | Male | No | Sat | Dinner | 4 |
| 24 | 19.82 | 3.18 | Male | No | Sat | Dinner | 2 |
| 25 | 17.81 | 2.34 | Male | No | Sat | Dinner | 4 |
| 26 | 13.37 | 2.00 | Male | No | Sat | Dinner | 2 |
| 27 | 12.69 | 2.00 | Male | No | Sat | Dinner | 2 |
| 28 | 21.70 | 4.30 | Male | No | Sat | Dinner | 2 |
| 29 | 19.65 | 3.00 | Female | No | Sat | Dinner | 2 |
| ... | ... | ... | ... | ... | ... | ... | ... |
| 214 | 28.17 | 6.50 | Female | Yes | Sat | Dinner | 3 |
| 215 | 12.90 | 1.10 | Female | Yes | Sat | Dinner | 2 |
| 216 | 28.15 | 3.00 | Male | Yes | Sat | Dinner | 5 |
| 217 | 11.59 | 1.50 | Male | Yes | Sat | Dinner | 2 |
| 218 | 7.74 | 1.44 | Male | Yes | Sat | Dinner | 2 |
| 219 | 30.14 | 3.09 | Female | Yes | Sat | Dinner | 4 |
| 220 | 12.16 | 2.20 | Male | Yes | Fri | Lunch | 2 |
| 221 | 13.42 | 3.48 | Female | Yes | Fri | Lunch | 2 |
| 222 | 8.58 | 1.92 | Male | Yes | Fri | Lunch | 1 |
| 223 | 15.98 | 3.00 | Female | No | Fri | Lunch | 3 |
| 224 | 13.42 | 1.58 | Male | Yes | Fri | Lunch | 2 |
| 225 | 16.27 | 2.50 | Female | Yes | Fri | Lunch | 2 |
| 226 | 10.09 | 2.00 | Female | Yes | Fri | Lunch | 2 |
| 227 | 20.45 | 3.00 | Male | No | Sat | Dinner | 4 |
| 228 | 13.28 | 2.72 | Male | No | Sat | Dinner | 2 |

| | total_bill | tip | sex | smoker | day | time | size |
|-----|------------|------|--------|--------|------|--------|------|
| 229 | 22.12 | 2.88 | Female | Yes | Sat | Dinner | 2 |
| 230 | 24.01 | 2.00 | Male | Yes | Sat | Dinner | 4 |
| 231 | 15.69 | 3.00 | Male | Yes | Sat | Dinner | 3 |
| 232 | 11.61 | 3.39 | Male | No | Sat | Dinner | 2 |
| 233 | 10.77 | 1.47 | Male | No | Sat | Dinner | 2 |
| 234 | 15.53 | 3.00 | Male | Yes | Sat | Dinner | 2 |
| 235 | 10.07 | 1.25 | Male | No | Sat | Dinner | 2 |
| 236 | 12.60 | 1.00 | Male | Yes | Sat | Dinner | 2 |
| 237 | 32.83 | 1.17 | Male | Yes | Sat | Dinner | 2 |
| 238 | 35.83 | 4.67 | Female | No | Sat | Dinner | 3 |
| 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 × 7 columns

```
In [36]: tips.head()  ## 앞의 데이터 조금만 살펴보기
```

```
Out[36]:
```

| | 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 |

```
In [23]: import pandas as pd
```

```
In [ ]: index=titanic_train["Survived"], # Make a crosstab
        columns="count") # Name the count column
```

```
In [27]: my_tab = pd.crosstab(index=tips["time"], # Make a crosstab
                             columns="count") # Name the count column
my_tab
```

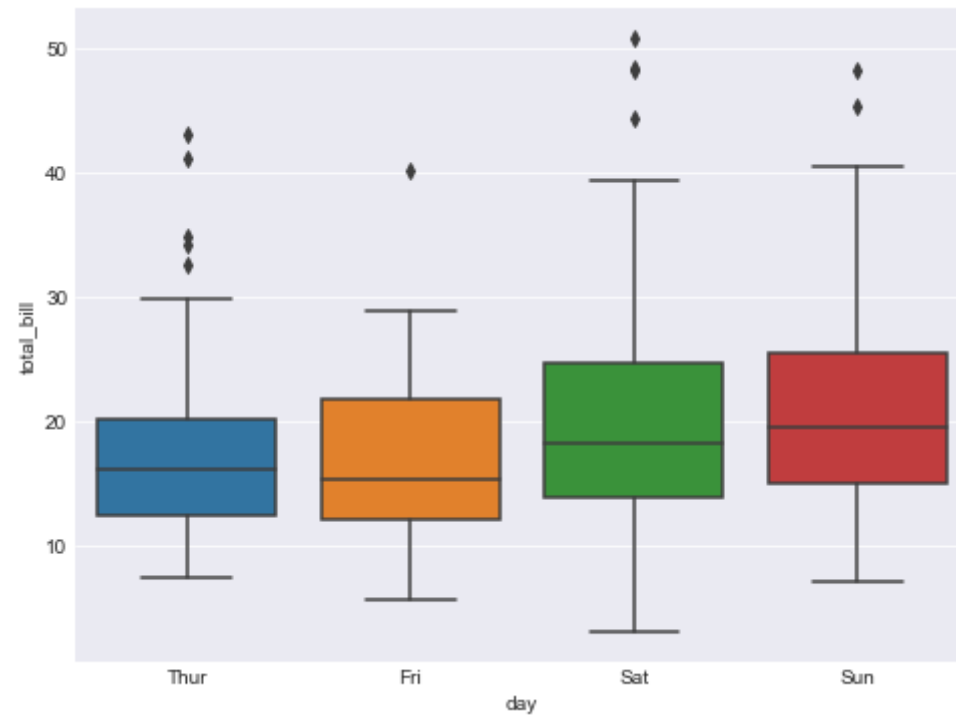
```
Out[27]:
```

| col_0 | count |
|--------|-------|
| time | |
| Lunch | 68 |
| Dinner | 176 |

Boxplot을 이용한 시각화 하기

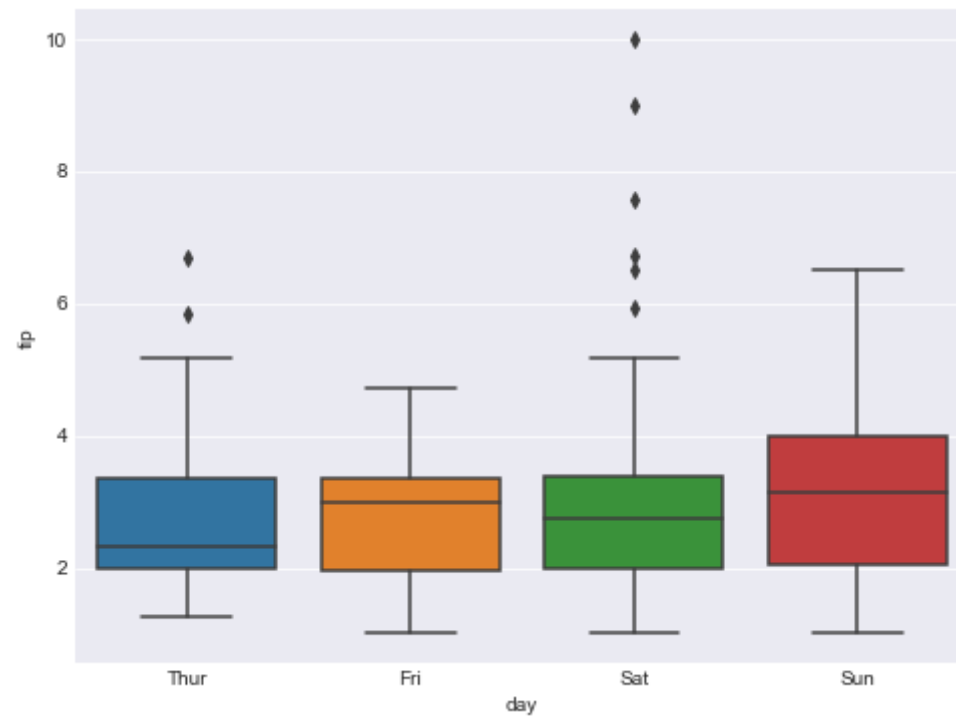
요일별 식사금액은 얼마나 될까?


```
In [34]: plt.figure(figsize=(8,6))  
sns.boxplot(x="day", y="total_bill", data=tips)  
plt.show()
```



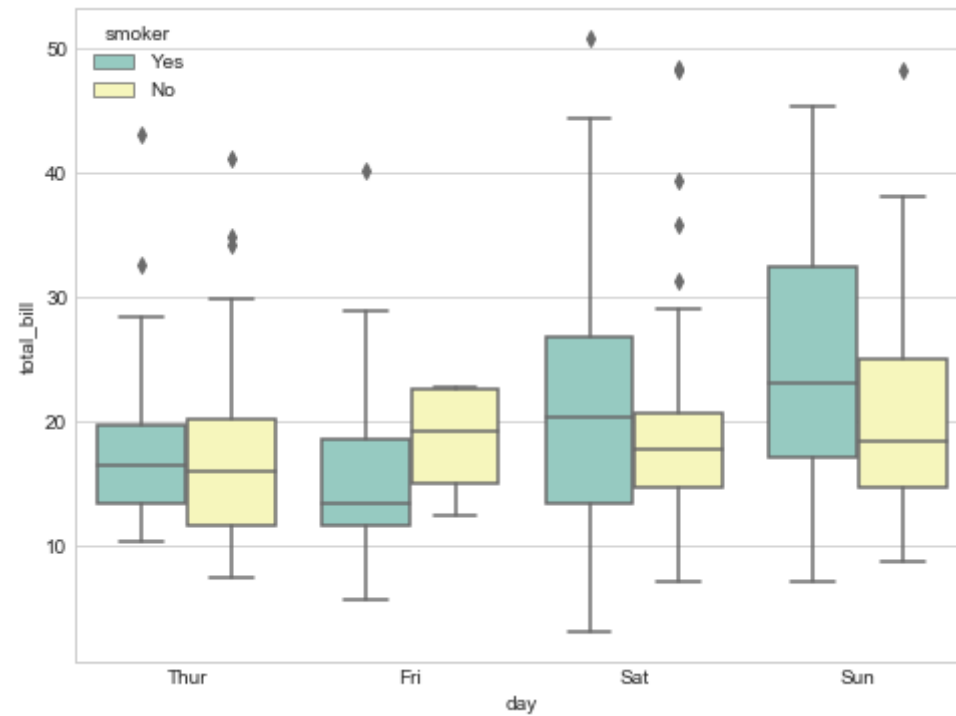
실습1. 요일별 Tip은 얼마나 될까?

```
In [35]: plt.figure(figsize=(8,6)) # 사이즈  
        _____ # 빈칸을 채워보자.  
        plt.show()
```



요일별 식사 금액, 그런데 흡연자와 비흡연자를 비교해 보자.

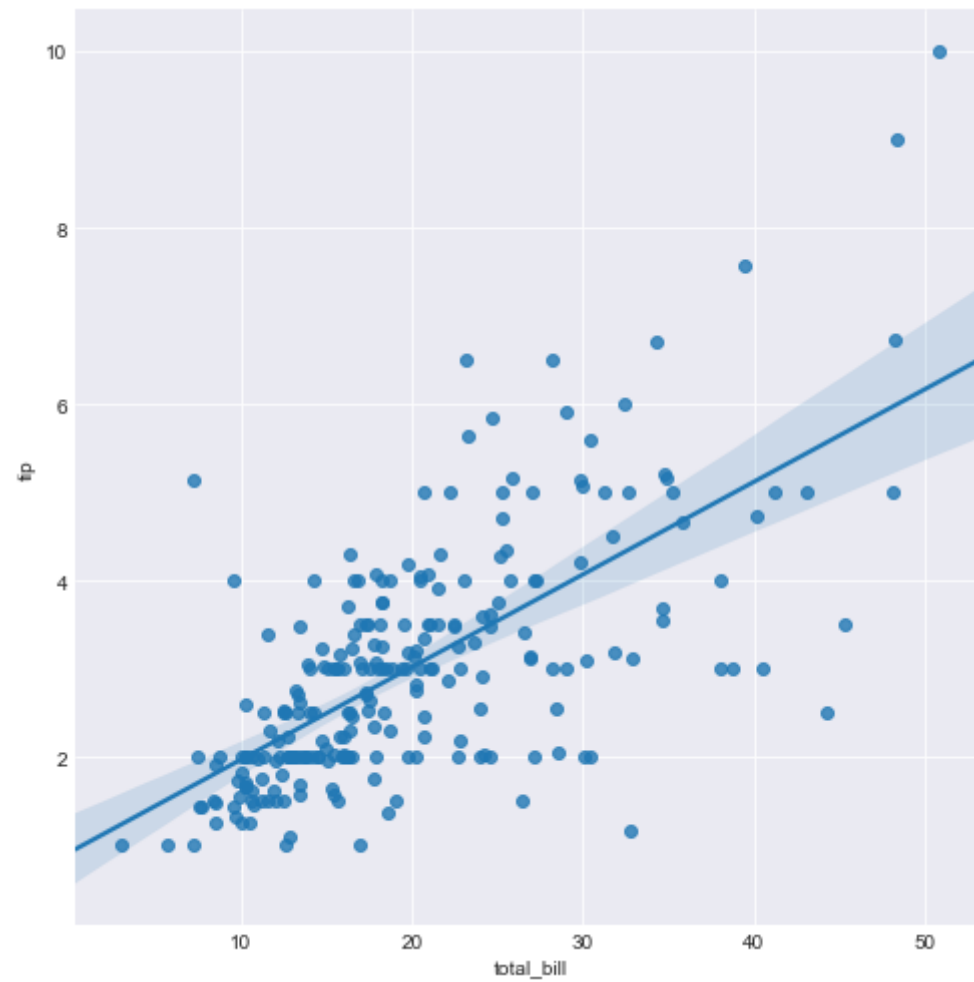
```
In [30]: plt.figure(figsize=(8,6))
sns.boxplot(x="day", y="total_bill", hue="smoker", data=tips, palette="Set3")
plt.show()
```



Regression(회귀선)을 그어서 대략적인 예측을 수행해보자.

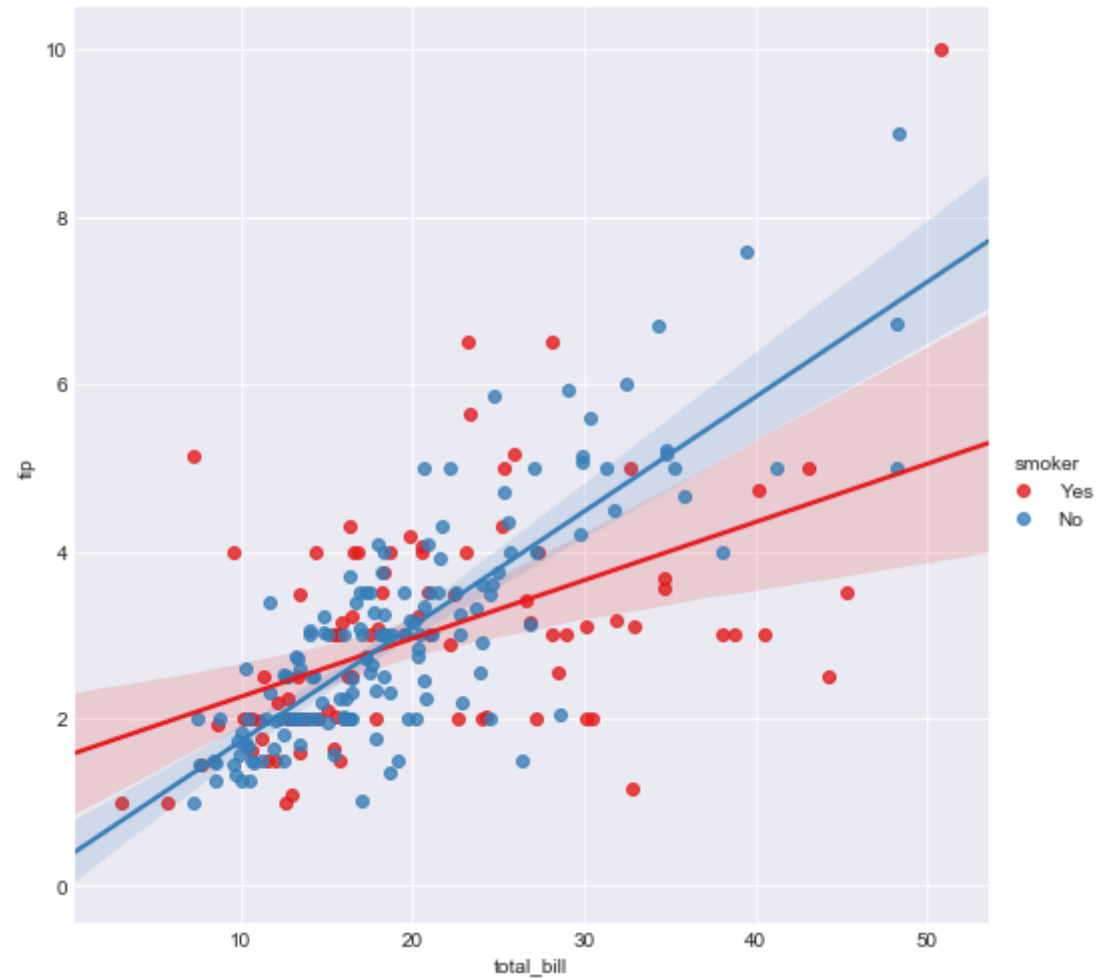
식사금액과 팁의 상관관계

```
In [33]: sns.set_style("darkgrid")  
sns.lmplot(x="total_bill", y="tip", data=tips, size=7)  
plt.show()
```



그러면 담배 필 때와 안 피는 사람은?

```
In [37]: sns.lmplot(x="total_bill", y="tip", hue="smoker", data=tips, palette="Set1", size=7)  
plt.show()
```



항공 데이터 이용

연도별 월 승객

...

```
In [49]: fg = sns.load_dataset("flights")  
fg.head(5)  
fg
```

Out[49]:

| | year | month | passengers |
|----|------|-----------|------------|
| 0 | 1949 | January | 112 |
| 1 | 1949 | February | 118 |
| 2 | 1949 | March | 132 |
| 3 | 1949 | April | 129 |
| 4 | 1949 | May | 121 |
| 5 | 1949 | June | 135 |
| 6 | 1949 | July | 148 |
| 7 | 1949 | August | 148 |
| 8 | 1949 | September | 136 |
| 9 | 1949 | October | 119 |
| 10 | 1949 | November | 104 |
| 11 | 1949 | December | 118 |
| 12 | 1950 | January | 115 |
| 13 | 1950 | February | 126 |
| 14 | 1950 | March | 141 |
| 15 | 1950 | April | 135 |
| 16 | 1950 | May | 125 |
| 17 | 1950 | June | 149 |
| 18 | 1950 | July | 170 |
| 19 | 1950 | August | 170 |
| 20 | 1950 | September | 158 |
| 21 | 1950 | October | 133 |
| 22 | 1950 | November | 114 |

| | year | month | passengers |
|-----|------|-----------|------------|
| 23 | 1950 | December | 140 |
| 24 | 1951 | January | 145 |
| 25 | 1951 | February | 150 |
| 26 | 1951 | March | 178 |
| 27 | 1951 | April | 163 |
| 28 | 1951 | May | 172 |
| 29 | 1951 | June | 178 |
| ... | ... | ... | ... |
| 114 | 1958 | July | 491 |
| 115 | 1958 | August | 505 |
| 116 | 1958 | September | 404 |
| 117 | 1958 | October | 359 |
| 118 | 1958 | November | 310 |
| 119 | 1958 | December | 337 |
| 120 | 1959 | January | 360 |
| 121 | 1959 | February | 342 |
| 122 | 1959 | March | 406 |
| 123 | 1959 | April | 396 |
| 124 | 1959 | May | 420 |
| 125 | 1959 | June | 472 |
| 126 | 1959 | July | 548 |
| 127 | 1959 | August | 559 |
| 128 | 1959 | September | 463 |

| | year | month | passengers |
|------------|------|-----------|------------|
| 129 | 1959 | October | 407 |
| 130 | 1959 | November | 362 |
| 131 | 1959 | December | 405 |
| 132 | 1960 | January | 417 |
| 133 | 1960 | February | 391 |
| 134 | 1960 | March | 419 |
| 135 | 1960 | April | 461 |
| 136 | 1960 | May | 472 |
| 137 | 1960 | June | 535 |
| 138 | 1960 | July | 622 |
| 139 | 1960 | August | 606 |
| 140 | 1960 | September | 508 |
| 141 | 1960 | October | 461 |
| 142 | 1960 | November | 390 |
| 143 | 1960 | December | 432 |

144 rows × 3 columns

In [50]: type(fg)

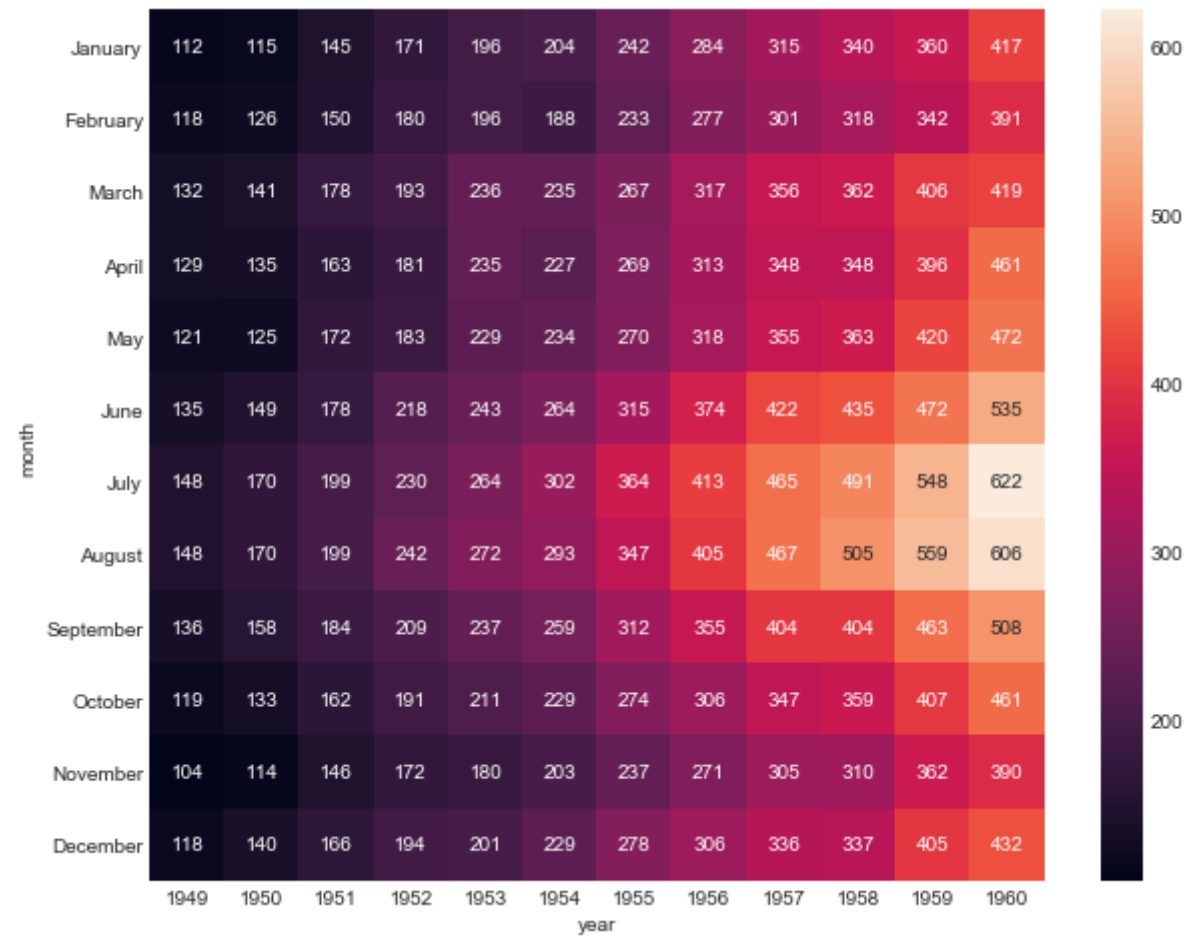
Out[50]: pandas.core.frame.DataFrame

```
In [51]: fgp = fg.pivot("month", "year", "passengers")
fgp
```

```
Out[51]:
```

| year | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| month | | | | | | | | | | | | |
| January | 112 | 115 | 145 | 171 | 196 | 204 | 242 | 284 | 315 | 340 | 360 | 417 |
| February | 118 | 126 | 150 | 180 | 196 | 188 | 233 | 277 | 301 | 318 | 342 | 391 |
| March | 132 | 141 | 178 | 193 | 236 | 235 | 267 | 317 | 356 | 362 | 406 | 419 |
| April | 129 | 135 | 163 | 181 | 235 | 227 | 269 | 313 | 348 | 348 | 396 | 461 |
| May | 121 | 125 | 172 | 183 | 229 | 234 | 270 | 318 | 355 | 363 | 420 | 472 |
| June | 135 | 149 | 178 | 218 | 243 | 264 | 315 | 374 | 422 | 435 | 472 | 535 |
| July | 148 | 170 | 199 | 230 | 264 | 302 | 364 | 413 | 465 | 491 | 548 | 622 |
| August | 148 | 170 | 199 | 242 | 272 | 293 | 347 | 405 | 467 | 505 | 559 | 606 |
| September | 136 | 158 | 184 | 209 | 237 | 259 | 312 | 355 | 404 | 404 | 463 | 508 |
| October | 119 | 133 | 162 | 191 | 211 | 229 | 274 | 306 | 347 | 359 | 407 | 461 |
| November | 104 | 114 | 146 | 172 | 180 | 203 | 237 | 271 | 305 | 310 | 362 | 390 |
| December | 118 | 140 | 166 | 194 | 201 | 229 | 278 | 306 | 336 | 337 | 405 | 432 |

```
In [52]: plt.figure(figsize=(10,8))
sns.heatmap(fgp, annot=True, fmt="d")
plt.show()
```



iris 데이터를 살펴보기

```
In [53]: sns.set(style="ticks")
iris = sns.load_dataset("iris")
iris
```

Out[53]:

| | sepal_length | sepal_width | petal_length | petal_width | species |
|----|--------------|-------------|--------------|-------------|---------|
| 0 | 5.1 | 3.5 | 1.4 | 0.2 | setosa |
| 1 | 4.9 | 3.0 | 1.4 | 0.2 | setosa |
| 2 | 4.7 | 3.2 | 1.3 | 0.2 | setosa |
| 3 | 4.6 | 3.1 | 1.5 | 0.2 | setosa |
| 4 | 5.0 | 3.6 | 1.4 | 0.2 | setosa |
| 5 | 5.4 | 3.9 | 1.7 | 0.4 | setosa |
| 6 | 4.6 | 3.4 | 1.4 | 0.3 | setosa |
| 7 | 5.0 | 3.4 | 1.5 | 0.2 | setosa |
| 8 | 4.4 | 2.9 | 1.4 | 0.2 | setosa |
| 9 | 4.9 | 3.1 | 1.5 | 0.1 | setosa |
| 10 | 5.4 | 3.7 | 1.5 | 0.2 | setosa |
| 11 | 4.8 | 3.4 | 1.6 | 0.2 | setosa |
| 12 | 4.8 | 3.0 | 1.4 | 0.1 | setosa |
| 13 | 4.3 | 3.0 | 1.1 | 0.1 | setosa |
| 14 | 5.8 | 4.0 | 1.2 | 0.2 | setosa |
| 15 | 5.7 | 4.4 | 1.5 | 0.4 | setosa |
| 16 | 5.4 | 3.9 | 1.3 | 0.4 | setosa |
| 17 | 5.1 | 3.5 | 1.4 | 0.3 | setosa |
| 18 | 5.7 | 3.8 | 1.7 | 0.3 | setosa |
| 19 | 5.1 | 3.8 | 1.5 | 0.3 | setosa |
| 20 | 5.4 | 3.4 | 1.7 | 0.2 | setosa |
| 21 | 5.1 | 3.7 | 1.5 | 0.4 | setosa |
| 22 | 4.6 | 3.6 | 1.0 | 0.2 | setosa |

| | sepal_length | sepal_width | petal_length | petal_width | species |
|-----|--------------|-------------|--------------|-------------|-----------|
| 23 | 5.1 | 3.3 | 1.7 | 0.5 | setosa |
| 24 | 4.8 | 3.4 | 1.9 | 0.2 | setosa |
| 25 | 5.0 | 3.0 | 1.6 | 0.2 | setosa |
| 26 | 5.0 | 3.4 | 1.6 | 0.4 | setosa |
| 27 | 5.2 | 3.5 | 1.5 | 0.2 | setosa |
| 28 | 5.2 | 3.4 | 1.4 | 0.2 | setosa |
| 29 | 4.7 | 3.2 | 1.6 | 0.2 | setosa |
| ... | ... | ... | ... | ... | ... |
| 120 | 6.9 | 3.2 | 5.7 | 2.3 | virginica |
| 121 | 5.6 | 2.8 | 4.9 | 2.0 | virginica |
| 122 | 7.7 | 2.8 | 6.7 | 2.0 | virginica |
| 123 | 6.3 | 2.7 | 4.9 | 1.8 | virginica |
| 124 | 6.7 | 3.3 | 5.7 | 2.1 | virginica |
| 125 | 7.2 | 3.2 | 6.0 | 1.8 | virginica |
| 126 | 6.2 | 2.8 | 4.8 | 1.8 | virginica |
| 127 | 6.1 | 3.0 | 4.9 | 1.8 | virginica |
| 128 | 6.4 | 2.8 | 5.6 | 2.1 | virginica |
| 129 | 7.2 | 3.0 | 5.8 | 1.6 | virginica |
| 130 | 7.4 | 2.8 | 6.1 | 1.9 | virginica |
| 131 | 7.9 | 3.8 | 6.4 | 2.0 | virginica |
| 132 | 6.4 | 2.8 | 5.6 | 2.2 | virginica |
| 133 | 6.3 | 2.8 | 5.1 | 1.5 | virginica |
| 134 | 6.1 | 2.6 | 5.6 | 1.4 | virginica |

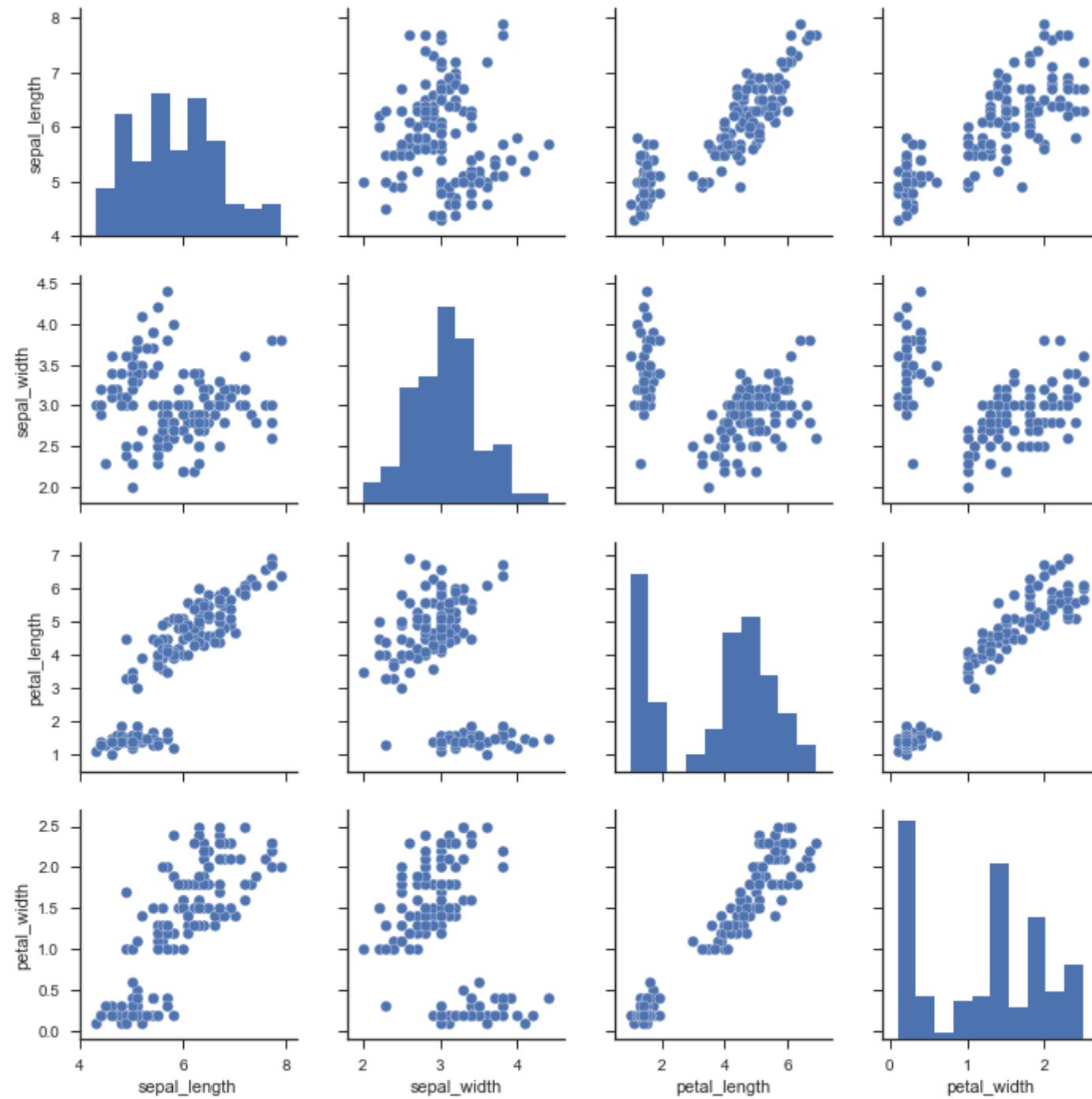
| | sepal_length | sepal_width | petal_length | petal_width | species |
|-----|--------------|-------------|--------------|-------------|-----------|
| 135 | 7.7 | 3.0 | 6.1 | 2.3 | virginica |
| 136 | 6.3 | 3.4 | 5.6 | 2.4 | virginica |
| 137 | 6.4 | 3.1 | 5.5 | 1.8 | virginica |
| 138 | 6.0 | 3.0 | 4.8 | 1.8 | virginica |
| 139 | 6.9 | 3.1 | 5.4 | 2.1 | virginica |
| 140 | 6.7 | 3.1 | 5.6 | 2.4 | virginica |
| 141 | 6.9 | 3.1 | 5.1 | 2.3 | virginica |
| 142 | 5.8 | 2.7 | 5.1 | 1.9 | virginica |
| 143 | 6.8 | 3.2 | 5.9 | 2.3 | virginica |
| 144 | 6.7 | 3.3 | 5.7 | 2.5 | virginica |
| 145 | 6.7 | 3.0 | 5.2 | 2.3 | virginica |
| 146 | 6.3 | 2.5 | 5.0 | 1.9 | virginica |
| 147 | 6.5 | 3.0 | 5.2 | 2.0 | virginica |
| 148 | 6.2 | 3.4 | 5.4 | 2.3 | virginica |
| 149 | 5.9 | 3.0 | 5.1 | 1.8 | virginica |

150 rows × 5 columns

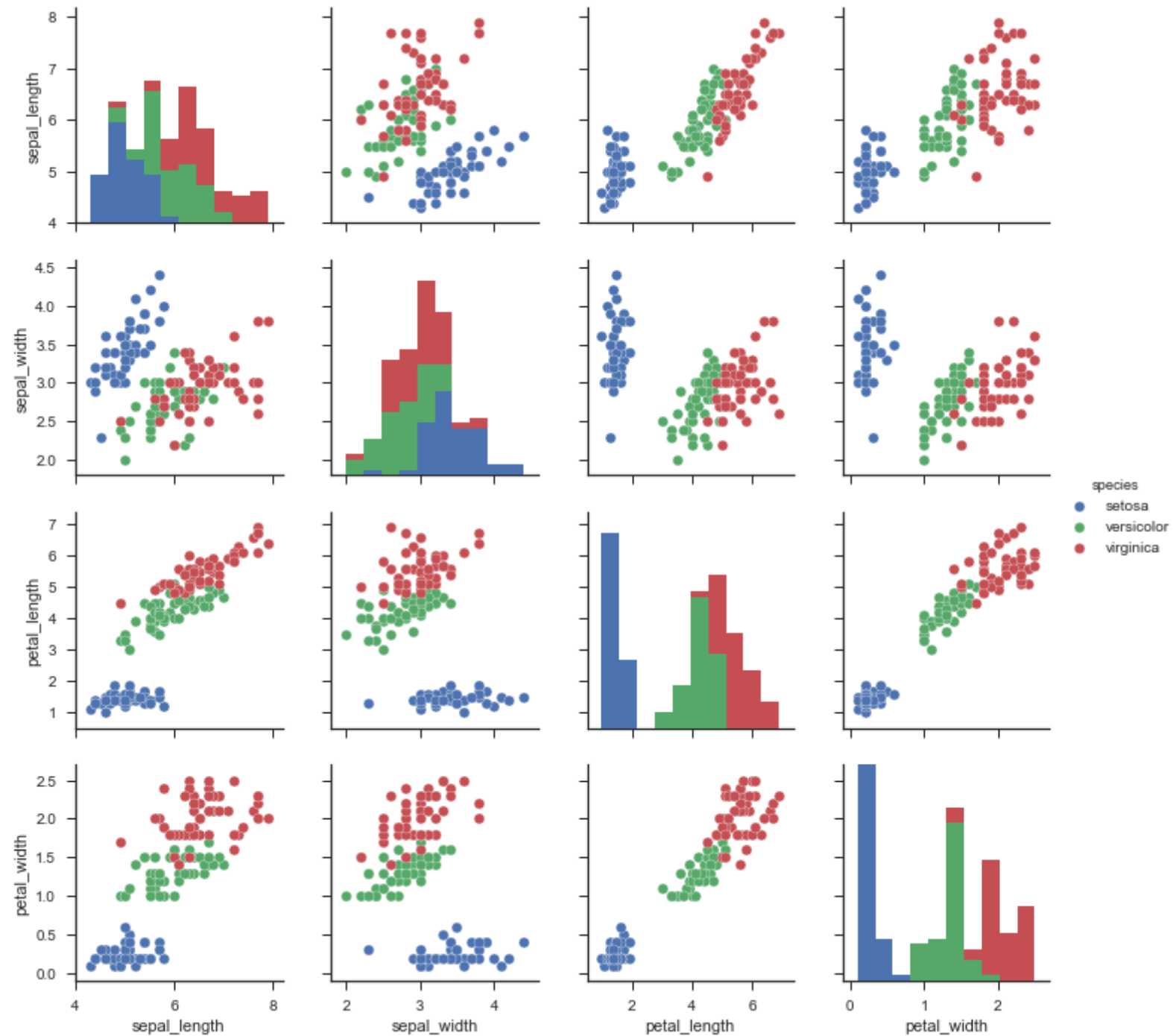
```
In [56]: sns.pairplot(iris)
```



```
Out[56]: <seaborn.axisgrid.PairGrid at 0x25160bf29b0>
```




```
In [54]: sns.pairplot(iris, hue="species")  
plt.show()
```



Reference

<http://seaborn.pydata.org/generated/seaborn.heatmap.html> (<http://seaborn.pydata.org/generated/seaborn.heatmap.html>)