Matplotlib

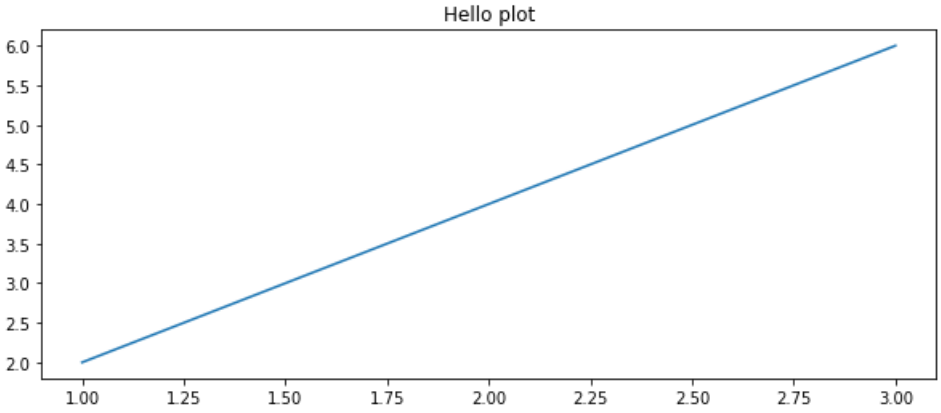
Figure와 Axes

In [2]:

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

In [4]:

```
# plt.figure()는 주로 figure의 크기를 조절하는 데 사용됨.
plt.figure(figsize=(10, 4)) # figure 크기가 가로 10, 세로 4인 Figure객체를 설정하고 반환함.

plt.plot([1, 2, 3], [2, 4, 6])
plt.title("Hello plot")
plt.show()
```



In [3]:

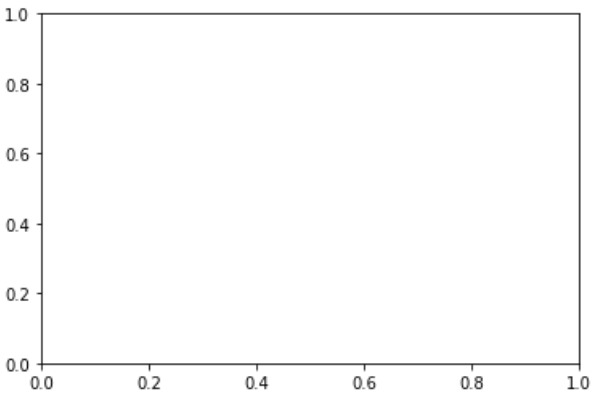
```
figure = plt.figure(figsize=(10, 4))
print(type(figure))
```

```
<class 'matplotlib.figure.Figure'>
<Figure size 720x288 with 0 Axes>
```

In [4]:

```
ax = plt.axes()
print(type(ax))
```

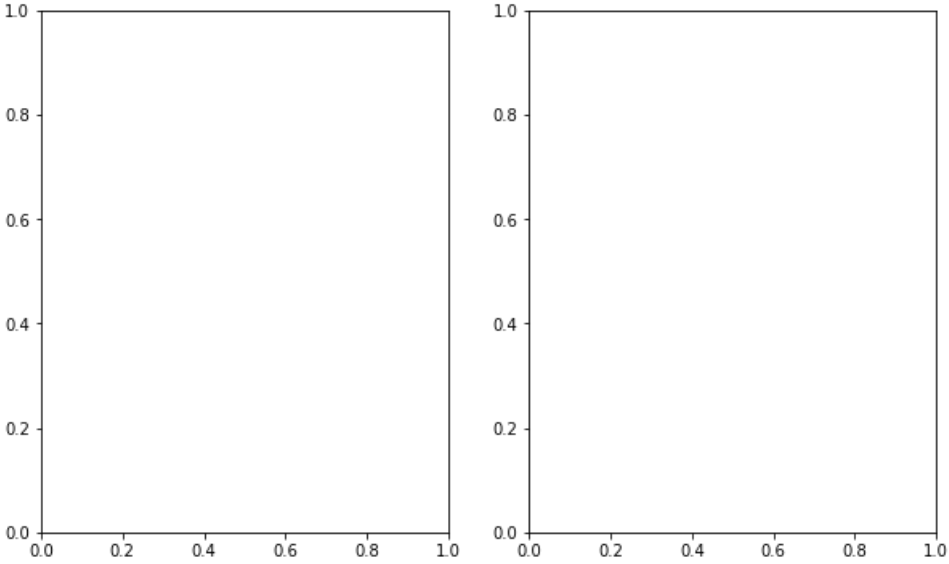
```
<class 'matplotlib.axes._subplots.AxesSubplot'>
```



여러개의 plot을 가지는 figure 설정

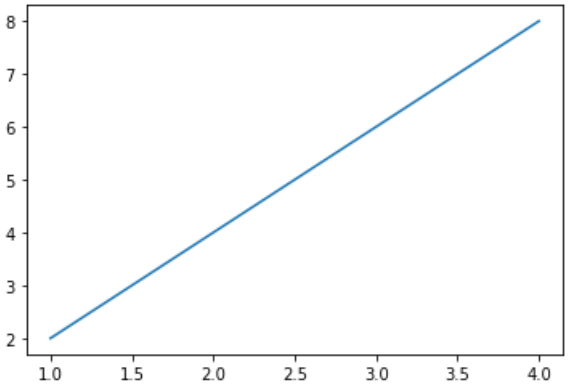
In [5]:

```
fig, (ax1, ax2) = plt.subplots(nrows=1, ncols=2, figsize=(12, 6))
```



In [8]:

```
import pandas as pd

df = pd.DataFrame({'x_value':[1, 2, 3, 4],
                   'y_value':[2, 4, 6, 8]})

# 입력값으로 pandas Series 및 DataFrame도 가능.
plt.plot(df['x_value'], df['y_value']);
```



In [12]:

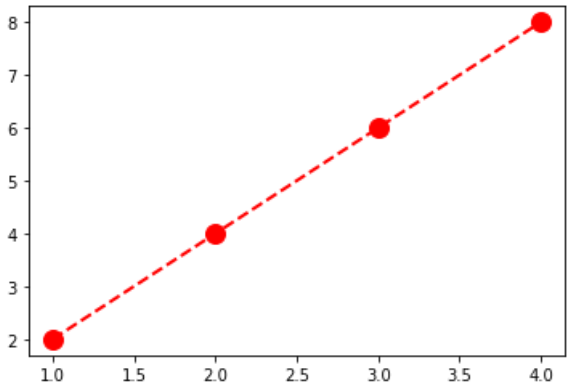
```
df
```

Out[12]:

	x_value	y_value
0	1	2
1	2	4
2	3	6
3	4	8

In [18]:

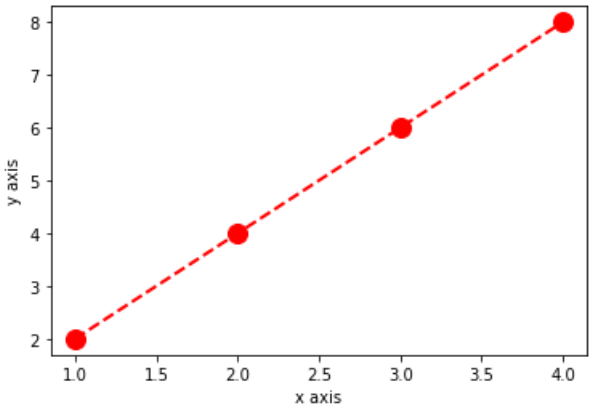
```
# API 기반으로 시각화를 구현할 때는 함수의 인자들에 대해서 알고 있어야 하는 부작용(?)이 있음.
plt.plot(x_value, y_value, color='red', marker='o', linestyle='dashed', linewidth=2, markersize=12);
```



x축, y축에 축명을 텍스트로 할당. xlabel, ylabel 적용

In [19]:

```
plt.plot(df.x_value, df.y_value, color='red', marker='o', linestyle='dashed', linewidth=2, markersize=12)
plt.xlabel('x axis')
plt.ylabel('y axis')
plt.show()
```

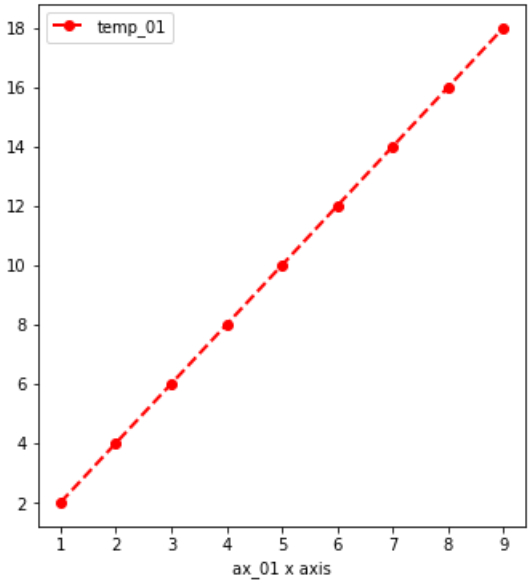


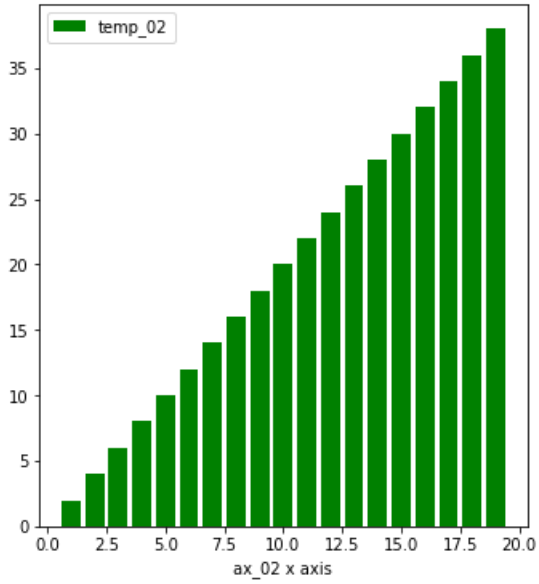
여러개의 subplots을 가지는 Figure를 생성하고 여기에 개별 그래프를 시각화

- nrows가 1일 때는 튜플로 axes를 받을 수 있음.
- nrows나 ncols가 1일때는 1차원 배열형태로, nrows와 ncols가 1보다 클때는 2차원 배열형태로 axes를 추출해야 함.

In [11]:

```
x_value_01 = np.arange(1, 10)
x_value_02 = np.arange(1, 20)
y_value_01 = 2 * x_value_01
y_value_02 = 2 * x_value_02

fig, (ax_01, ax_02) = plt.subplots(nrows=1, ncols=2, figsize=(12, 6))

ax_01.plot(x_value_01, y_value_01, color='red', marker='o', linestyle='dashed', linewidth=2, markersize=6, lab
ax_02.bar(x_value_02, y_value_02, color='green', label='temp_02')

ax_01.set_xlabel('ax_01 x axis')
ax_02.set_xlabel('ax_02 x axis')

ax_01.legend()
ax_02.legend()

#plt.legend()
plt.show()
```





Seaborn

타이타닉 데이터세트 로딩하기

In [1]:

```
import pandas as pd

df = pd.read_csv('./data/titanic_train.csv')
df.head(5)
```

Out[1]:

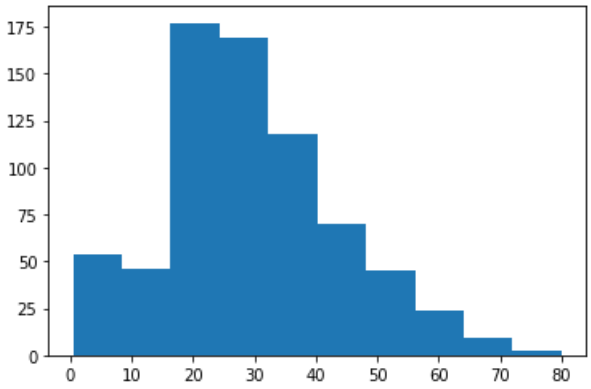
	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

histogram

- 연속값에 대한 구간별 도수 분포를 시각화

In [2]:

```
### matplotlib histogram
import matplotlib.pyplot as plt

plt.hist(df['Age'])
plt.show()
```



seaborn histogram

- seaborn의 예전 histogram은 distplot함수지만 deprecate됨.
- seaborn의 histogram은 histplot과 displot이 대표적이며 histplot은 axes레벨, displot은 figure레벨임.

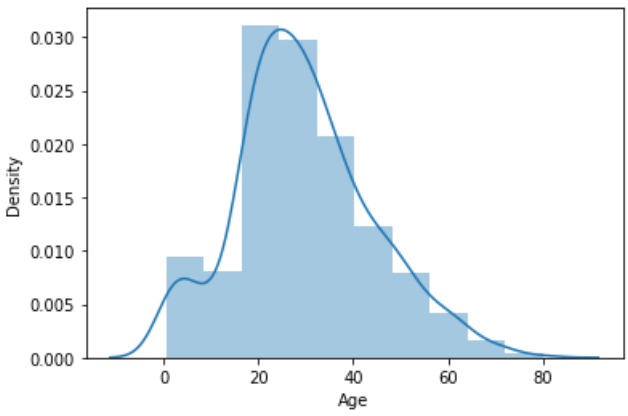
In [3]:

```
import seaborn as sns
#import warnings
#warnings.filterwarnings('ignore')

sns.distplot(df['Age'], bins=10)
```

```
C:\Dev\Miniconda\lib\site-packages\seaborn\distributions.py:2619: FutureWarning: `distplot` is a deprecated fu
nction and will be removed in a future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[3]:

```
<AxesSubplot:xlabel='Age', ylabel='Density'>
```



In [4]:

```
# distplot은 x, data와 같이 컬럼명을 x인자로 설정할 수 없음.
sns.histplot(x='Age', data=df)
```

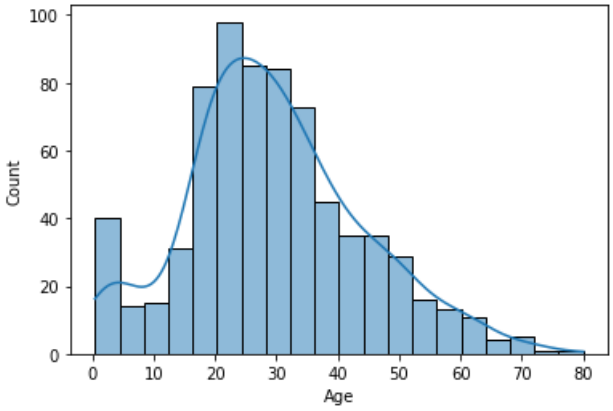
```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipykernel_148926/2624192492.py in <module>
      1 # distplot은 x, data와 같이 컬럼명을 x인자로 설정할 수 없음.
----> 2 sns.distplot(x='Age', data=df)

TypeError: distplot() got an unexpected keyword argument 'data'
```

In [19]:

```
### seaborn histogram
import seaborn as sns

# seaborn에서도 figure로 canvas의 사이즈를 조정
#plt.figure(figsize=(10, 6))
# Pandas DataFrame의 컬럼명을 자동으로 인식해서 xlabel값을 할당. ylabel 값은 histogram일때 Count 할당.
sns.histplot(df['Age'], kde=True)
#plt.show()
```

Out[19]:

```
<AxesSubplot:xlabel='Age', ylabel='Count'>
```

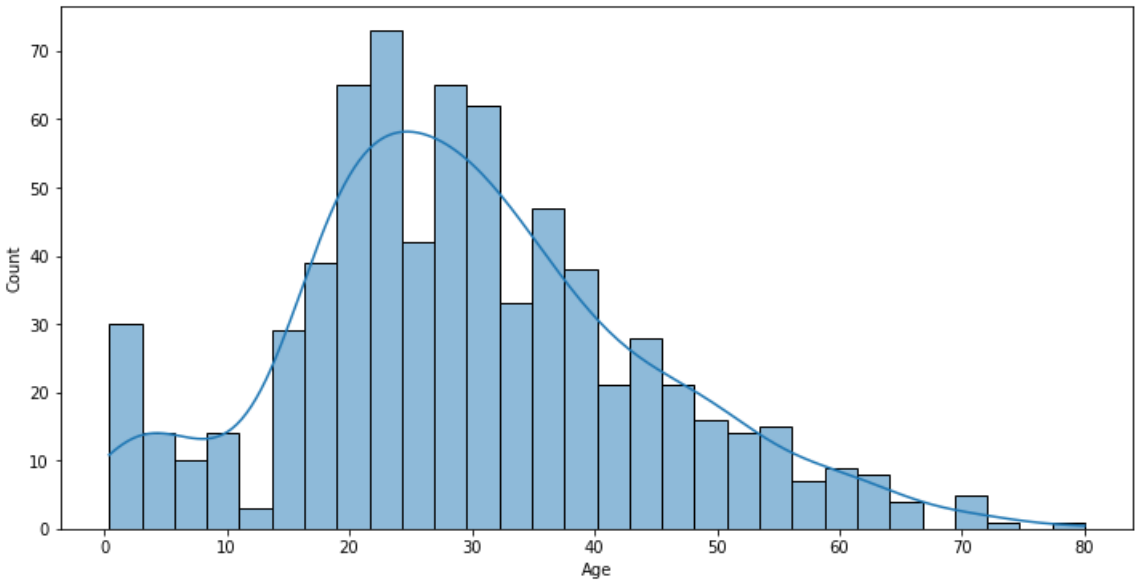


In [21]:

```
plt.figure(figsize=(12, 6))
sns.histplot(x='Age', data=df, kde=True, bins=30)
```

Out[21]:

```
<AxesSubplot:xlabel='Age', ylabel='Count'>
```

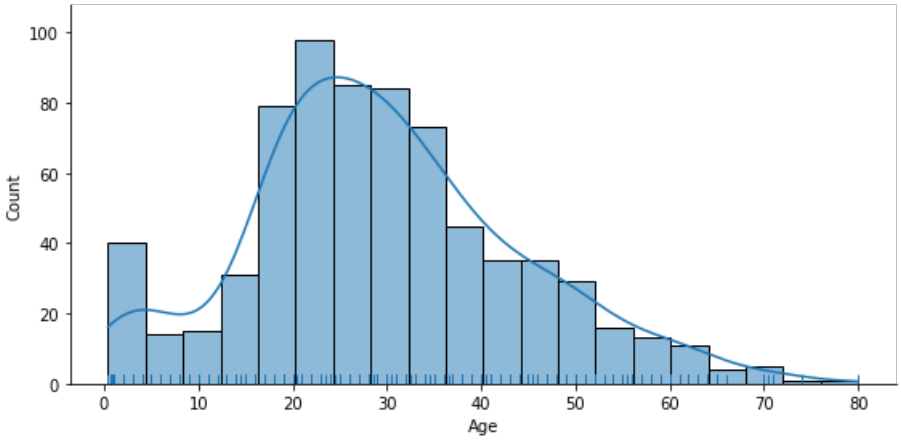


In [23]:

```
import seaborn as sns

# seaborn의 figure레벨 그래프는 plt.figure로 figure 크기를 조절할 수 없습니다.
#plt.figure(figsize=(4, 4))
# Pandas DataFrame의 컬럼명을 자동으로 인식해서 xlabel값을 할당. ylabel 값은 histogram일때 Count 할당.
sns.displot(df['Age'], kde=True, rug=True, height=6, aspect=2)
#plt.show()
```

Out[23]:

```
<seaborn.axisgrid.FacetGrid at 0x7f51e639af10>
```



countplot

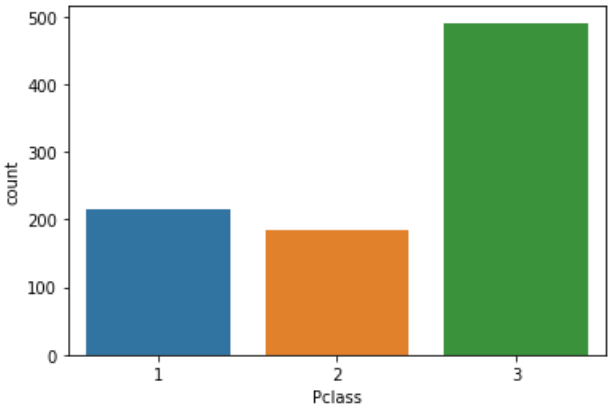
- 카테고리 값에 대한 건수를 표현. x축이 카테고리값, y축이 해당 카테고리값에 대한 건수

In [25]:

```
sns.countplot(x='Pclass', data=df) # valuecount를 한 것을 시각화
```

Out[25]:

```
<AxesSubplot:xlabel='Pclass', ylabel='count'>
```



barplot

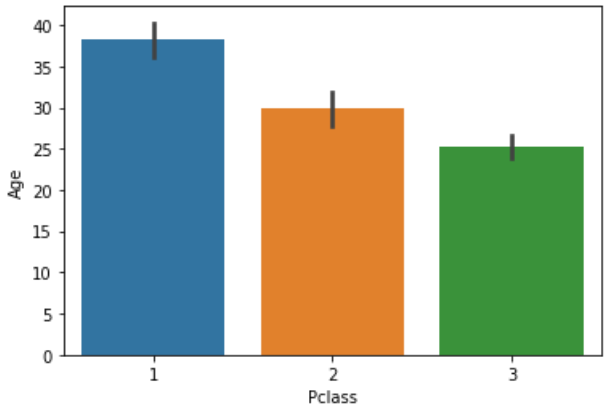
- seaborn의 barplot은 x축은 이산값(주로 category값), y축은 연속값(y값의 평균/총합)을 표현

In [26]:

```
#plt.figure(figsize=(10, 6))
# 자동으로 xlabel, ylabel을 x입력값, y입력값으로 설정.
sns.barplot(x='Pclass', y='Age', data=df)
```

Out[26]:

```
<AxesSubplot:xlabel='Pclass', ylabel='Age'>
```

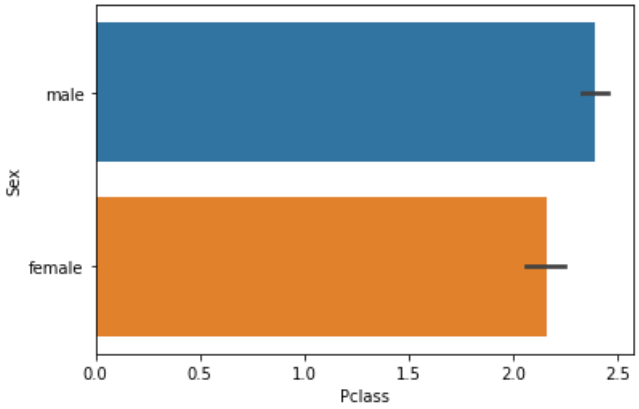


In [28]:

```
### 수직 barplot에 y축을 문자값으로 설정하면 자동으로 수평 barplot으로 변환
sns.barplot(x='Pclass', y='Sex', data=df)
```

Out[28]:

```
<AxesSubplot:xlabel='Pclass', ylabel='Sex'>
```



barplot에서 hue를 이용

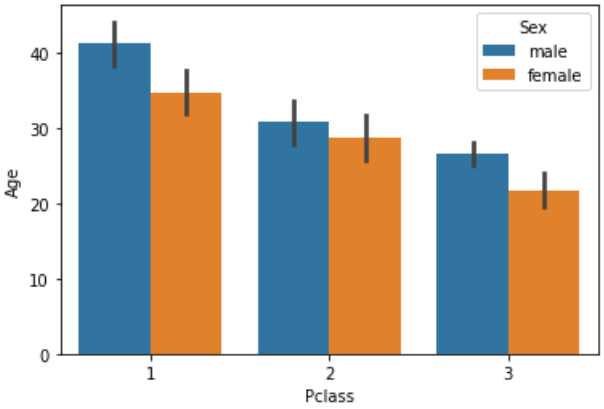
- X값을 특정 컬럼별로 세분화하여 시각화

In [55]:

```
# 아래는 Pclass가 X축값이며 hue파라미터로 Sex를 설정하여 개별 Pclass 값 별로 Sex에 따른 Age 평균 값을 구함.
sns.barplot(x='Pclass', y='Age', hue='Sex', data=df)
```

Out[55]:

```
<AxesSubplot:xlabel='Pclass', ylabel='Age'>
```



violinplot

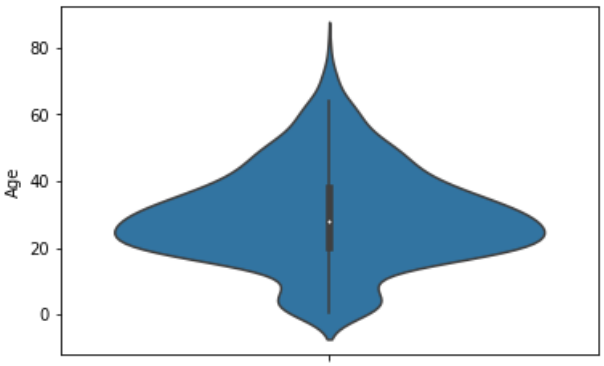
- 단일 컬럼에 대해서는 히스토그램과 유사하게 연속값의 분포도를 시각화. 또한 중심에는 4분위를 알수있음.
- 보통은 X축에 설정한 컬럼의 개별 이산값 별로 Y축 컬럼값의 분포도를 시각화하는 용도로 많이 사용

In [31]:

```
# Age 컬럼에 대한 연속 확률 분포 시각화
sns.violinplot(y='Age', data=df)
```

Out[31]:

```
<AxesSubplot:ylabel='Age'>
```

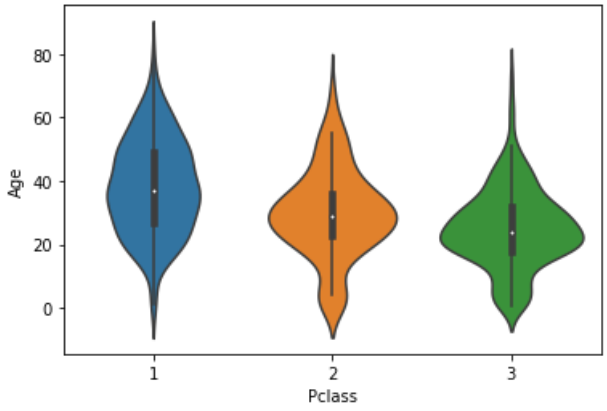


In [33]:

```
# x축값인 Pclass의 값별로 y축 값인 Age의 연속분포 곡선을 알 수 있음.
sns.violinplot(x='Pclass', y='Age', data=df)
```

Out[33]:

```
<AxesSubplot:xlabel='Pclass', ylabel='Age'>
```



boxplot

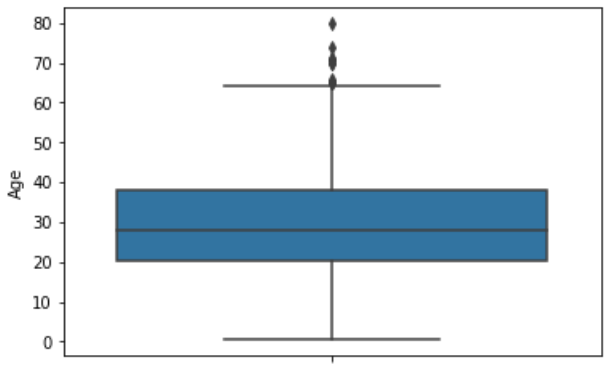
- 4분위를 박스 형태로 표현
- x축값에 이산값을 부여하면 이산값에 따른 box plot을 시각화

In [56]:

```
sns.boxplot(y='Age', data=df)
```

Out[56]:

```
<AxesSubplot:ylabel='Age'>
```



scatterplot

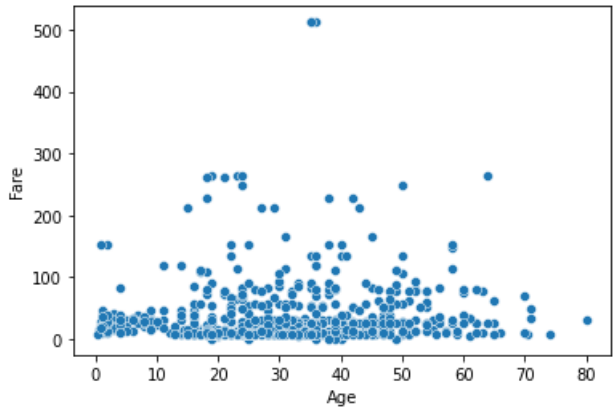
- 산포도로서 X와 Y축에 보통 연속형 값을 시각화. hue, style등을 통해 breakdown 정보를 표출할 수 있습니다.

In [39]:

```
sns.scatterplot(x='Age', y='Fare', data=df)
```

Out[39]:

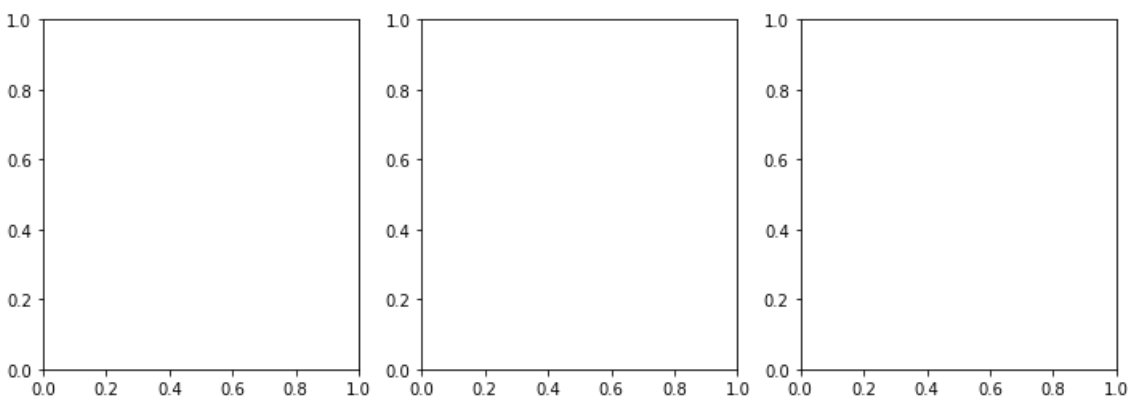
```
<AxesSubplot:xlabel='Age', ylabel='Fare'>
```



seaborn에서 subplots 이용하기

In [57]:

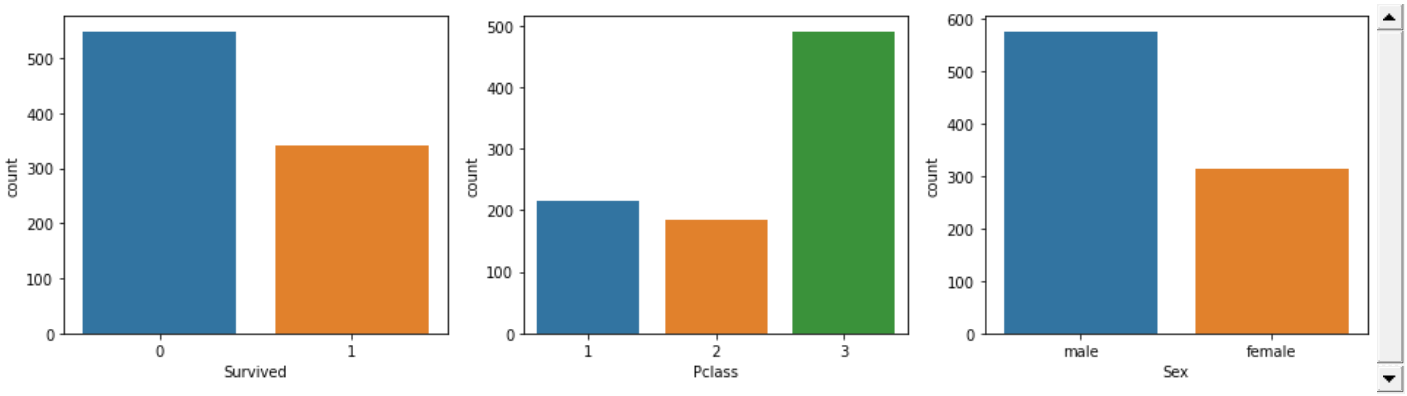
```
fig, axs = plt.subplots(nrows=1, ncols=3, figsize=(12, 4))
```



In [69]:

```
cat_columns = ['Survived', 'Pclass', 'Sex']

# nrows는 1이고 ncols는 컬럼의 갯수만큼인 subplots을 설정.
fig, axs = plt.subplots(nrows=1, ncols=len(cat_columns), figsize=(16, 4))

for index, column in enumerate(cat_columns):
    print('index:', index)
    # seaborn의 Axes 레벨 function들은 ax인자로 subplots의 어느 Axes에 위치할지 설정.
    sns.countplot(x=column, data=df, ax=axs[index])
    # if index == 3:
    #     # plt.xticks(rotation=90)으로 간단하게 할수 있지만 Axes 객체를 직접 이용할 경우 API가 상대적으로 복잡.
    #     axs[index].set_xticklabels(axs[index].get_xticklabels(), rotation=90)
```

```
index: 0
index: 1
index: 2
```



상관 Heatmap

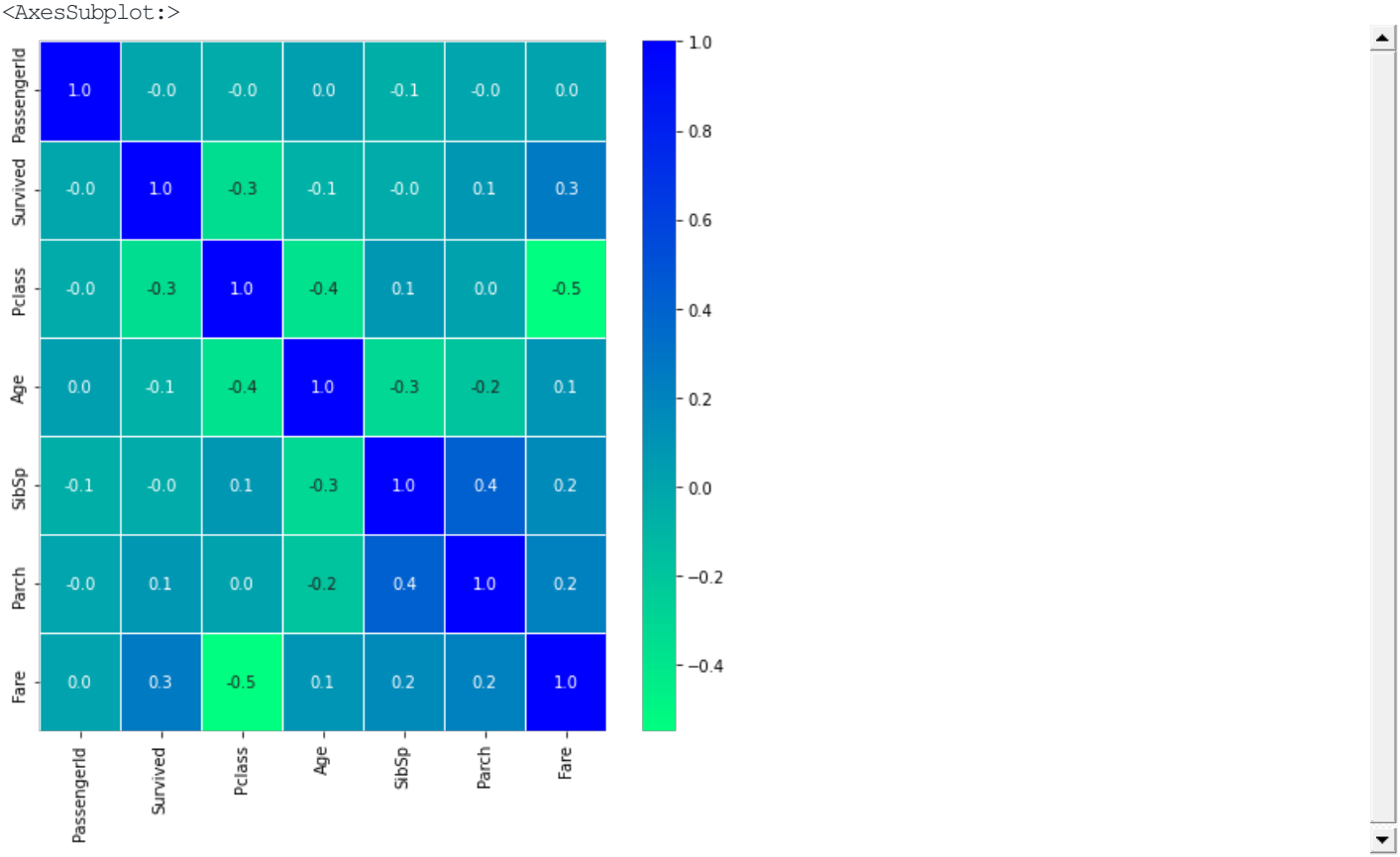
- 컬럼간의 상관도를 Heatmap형태로 표현

In [67]:

```
### 상관 Heatmap

plt.figure(figsize=(8, 8))

# DataFrame의 corr()은 숫자형 값만 상관도를 구함.
corr = df.corr()

sns.heatmap(corr, annot=True,  fmt='.1f', linewidths=0.5, cmap='winter_r')
#sns.heatmap(corr, annot=True, fmt='.2g', cbar=True, linewidths=0.5, cmap='YlGnBu')
```

Out[67]:

```
<AxesSubplot:>
```



Problems

학생 성적에 관한 소규모 데이터의 시각화 포함 탐색적 자료 분석을 시행 하시오

기본 코드

In [43]:

```
# 기본 코드
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# 데이터 불러오기
df = pd.read_csv('./data/student_data.csv')
df.head()
```

Out[43]:

	school	sex	paid	activities	famrel	freetime	goout	Dalc	Walc	health	absences	grade	G1	G2
0	GP	F	no	no	4.0	3.0	4.0	1.0	1.0	3.0	6.0	6	5	6
1	GP	F	no	no	5.0	3.0	3.0	1.0	1.0	3.0	4.0	5	5	5
2	GP	F	yes	no	4.0	3.0	2.0	2.0	3.0	3.0	10.0	8	7	8
3	GP	F	yes	yes	3.0	2.0	2.0	1.0	1.0	5.0	2.0	15	15	14
4	GP	F	yes	no	4.0	3.0	2.0	1.0	2.0	5.0	4.0	9	6	10

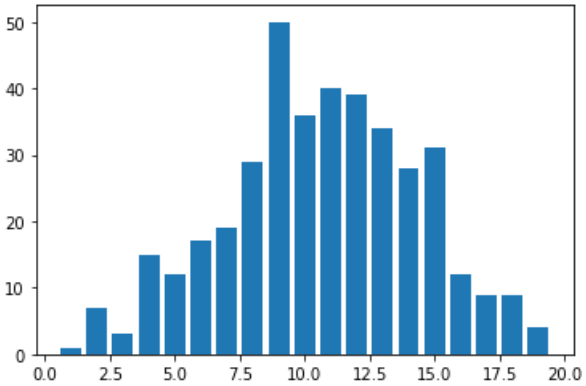
학생 성적의 분포를 시각화 하여 확인 하세요

In [44]:

```
plt.bar()
```

Out[44]:

```
<BarContainer object of 19 artists>
```

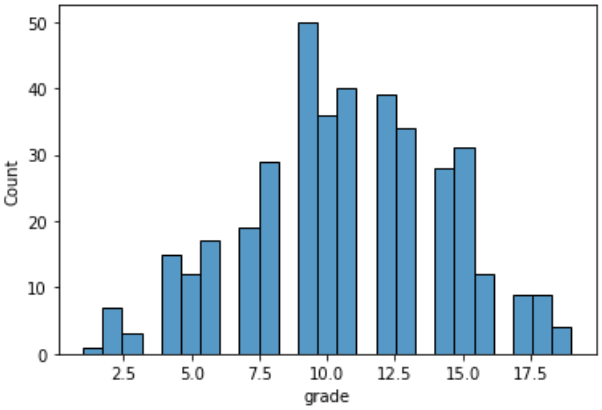


In [50]:

```
sns.histplot()
```

Out[50]:

```
<AxesSubplot:xlabel='grade', ylabel='Count'>
```



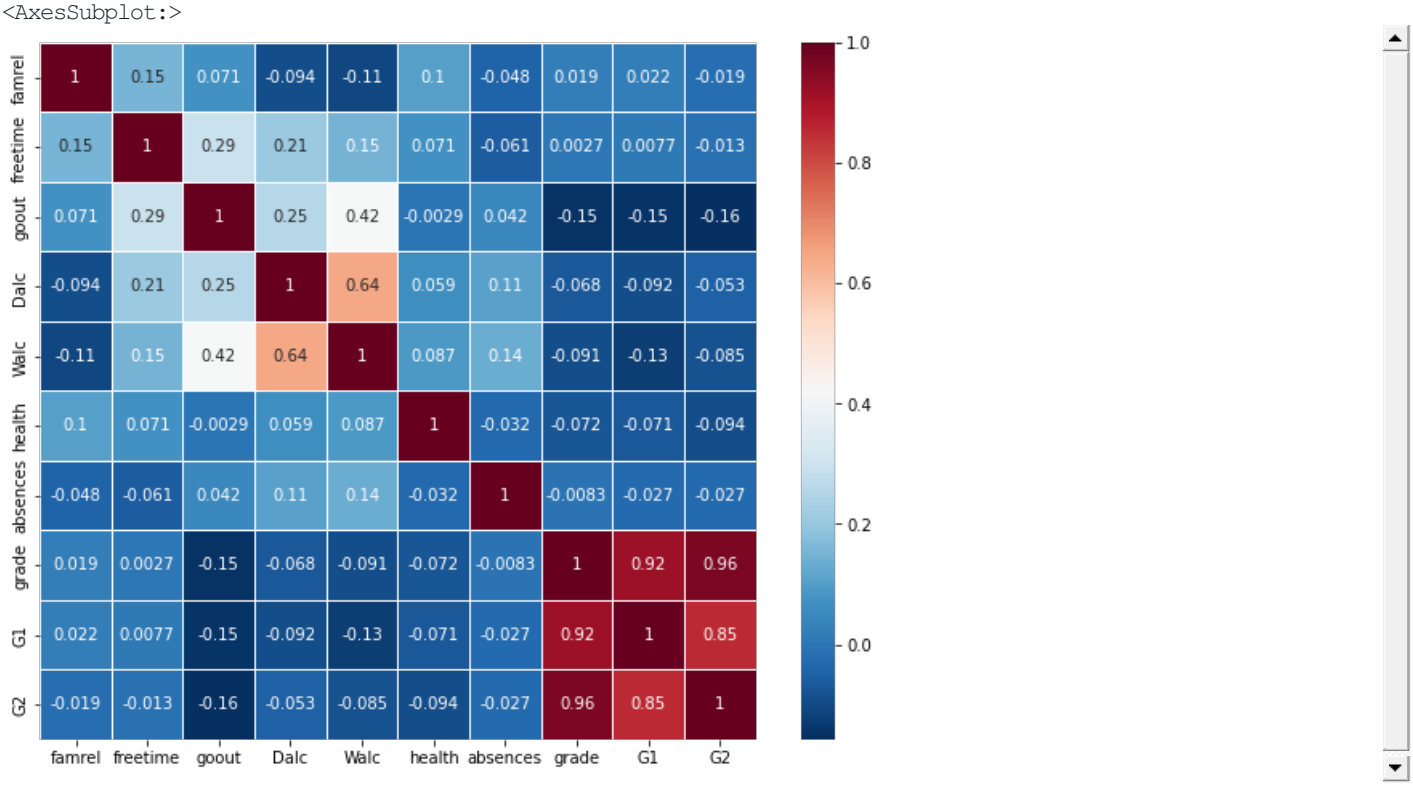
각 변수들간의 상관 관계를 시각화 하세요.

In [54]:

```
plt.figure(figsize=(10, 8))
df_cor = df.corr()
sns.heatmap()
```

Out[54]:

<AxesSubplot:>



당뇨병 유무와 신체검사 데이터의 시각화를 시행하시오.

기본 코드

In [74]:

```
# 기본 코드
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# 데이터 불러오기
df = pd.read_csv('./data/diabetes_for_test.csv')
df.head()
```

Out[74]:

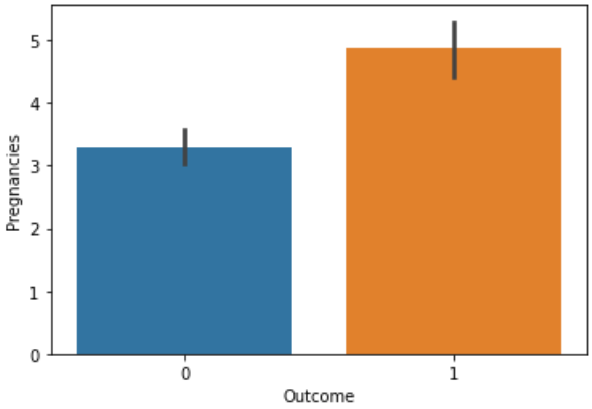
	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

In [81]:

```
sns.barplot(x =  'Outcome', y = 'Pregnancies', data = df)
```

Out[81]:

```
<AxesSubplot:xlabel='Outcome', ylabel='Pregnancies'>
```



In [83]:

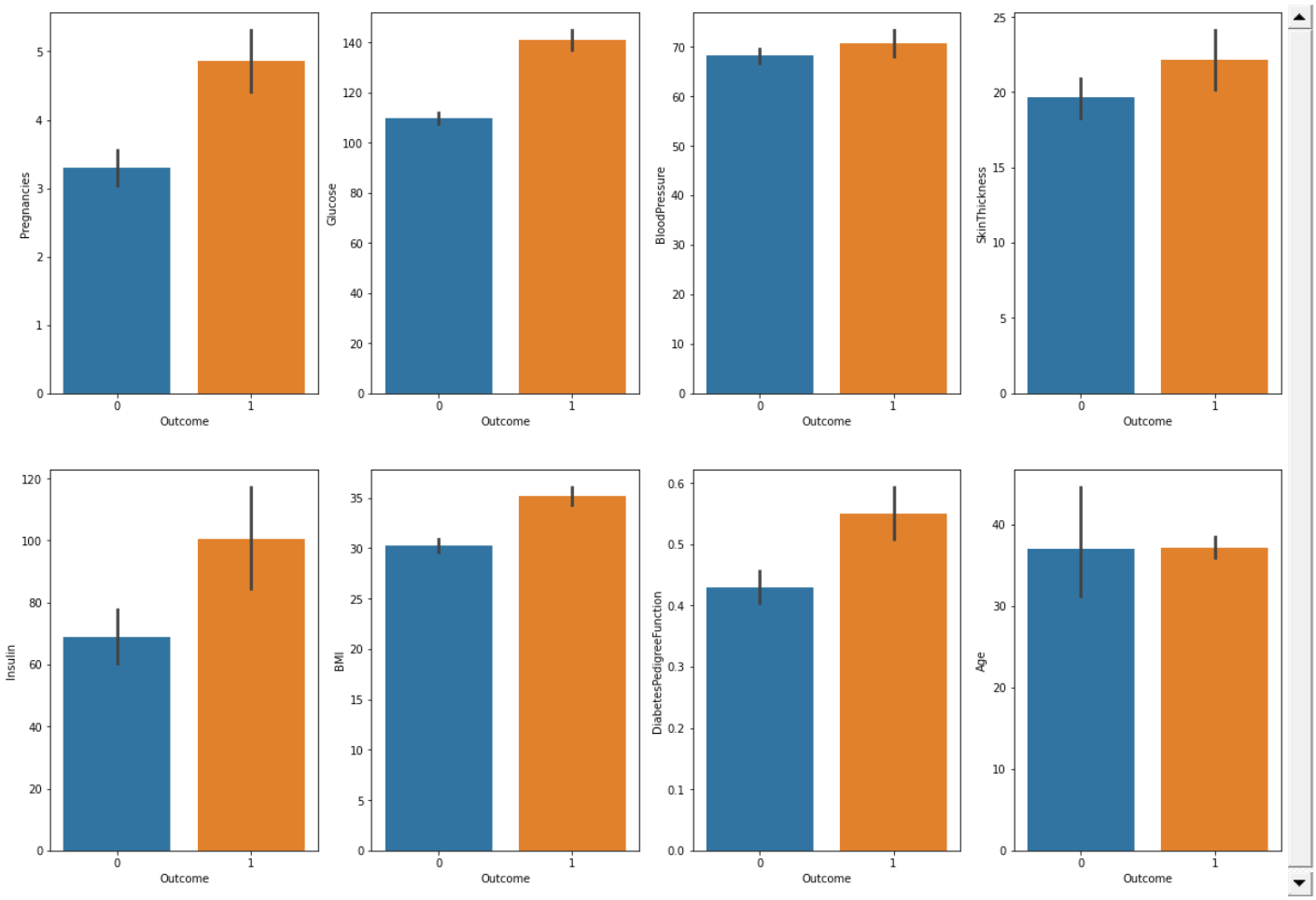
```
cols
```

Out[83]:

```
['Pregnancies',
 'Glucose',
 'BloodPressure',
 'SkinThickness',
 'Insulin',
 'BMI',
 'DiabetesPedigreeFunction',
 'Age']
```

In [84]:

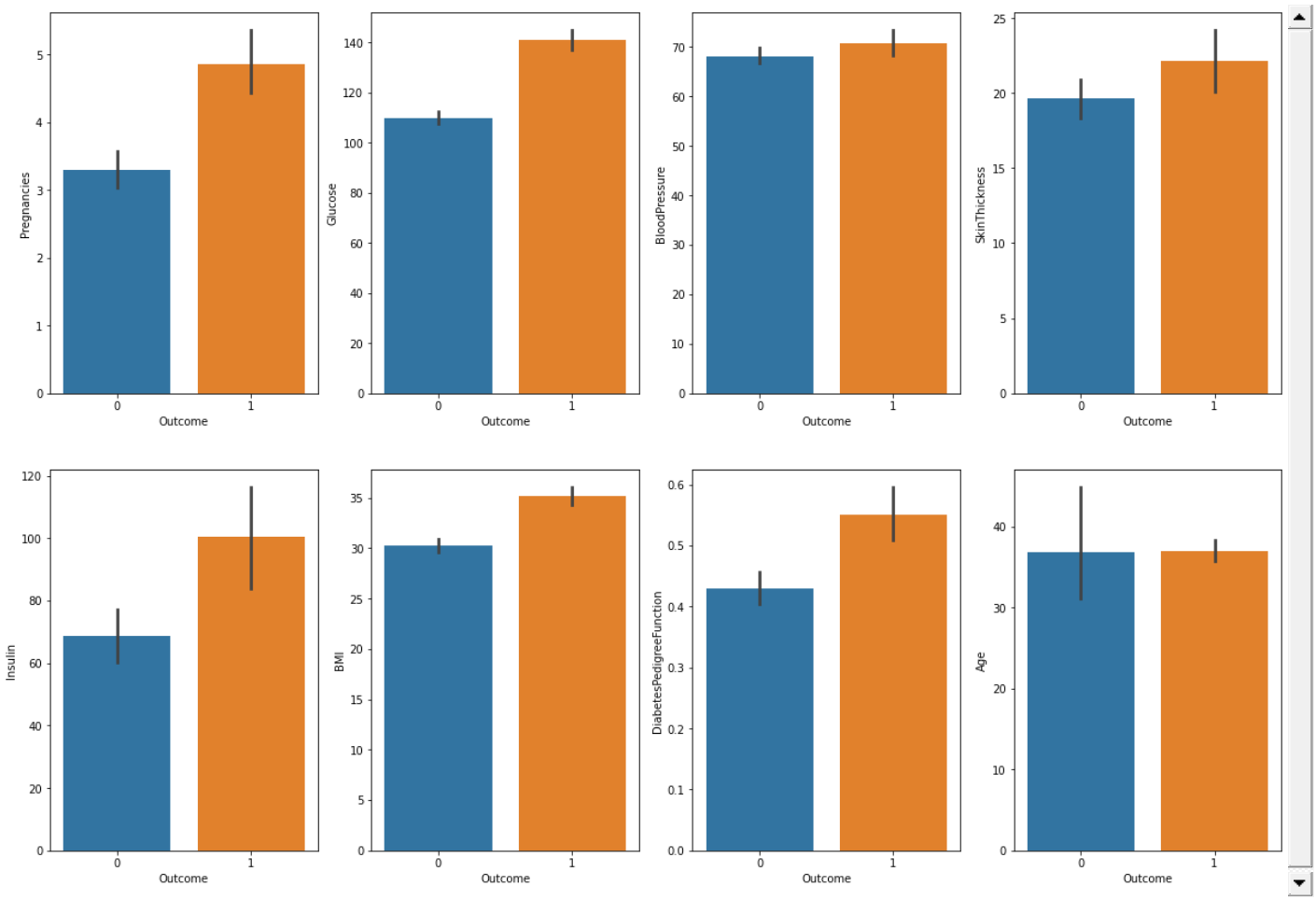
```
import matplotlib.pyplot as plt

cols = list(df.columns[:-1])
fig, axes = plt.subplots(2,4, figsize = (20, 14))
for idx, col in enumerate(cols):
    nrow = idx // 4
    ncol = idx % 4
    sns.barplot(x = 'Outcome', y = col, data = df, ax = axes[nrow][ncol])
```



당뇨병 유무에 따른 독립변수들의 분포를 시각화 하시오.

In [79]:

```
cols = ['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'DiabetesPedigreeFunctio
fig, axes = plt.subplots(nrows=2, ncols=4, figsize=(20,14))

for index, col in enumerate(cols):
    pass
```

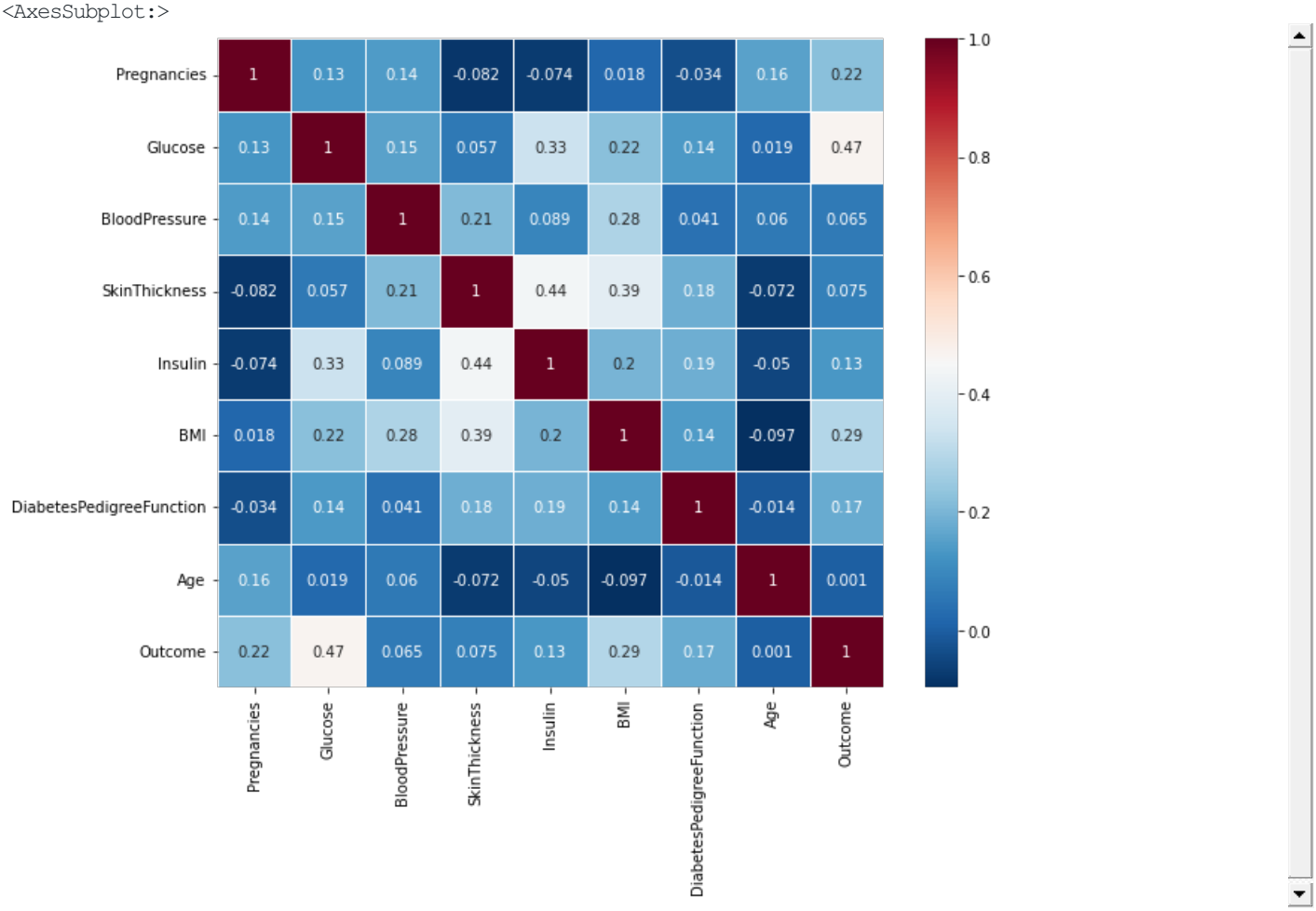


각 변수들간의 상관 관계를 시각화 하세요.

In [80]:

Out[80]:

<AxesSubplot:>



동행지수 순환변동치와 선행지수 순환변동치를 시각화 하시오

- 아래는, 경기종합지수 (순환변동치)를 2021년 7월 부터 2022년 7월 까지, 1년간의 시각화를 한 것이다.
- 2008년 1월 부터 2022년 7월 까지의 값을 시각화 하라
- 소스 : https://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=1057

용어 해설

(1) 선행종합지수는 앞으로의 경기동향을 예측하는 지표로서 구인구직비율, 건설수주액, 재고순환지표 등과 같이 앞으로 일어날 경제현상을 미리 알려주는 9개 지표들의 움직임을 종합하여 작성함
(2) 동행종합지수는 현재의 경기상태를 나타내는 지표로서 광공업생산지수, 소매판매액지수, 비농림어업취업자수 등과 같이 국민경제 전체의 경기변동과 거의 동일한 방향으로 움직이는 7개 지표로 구성됨

기본코드

matplotlib 한글화 코드

In [85]:

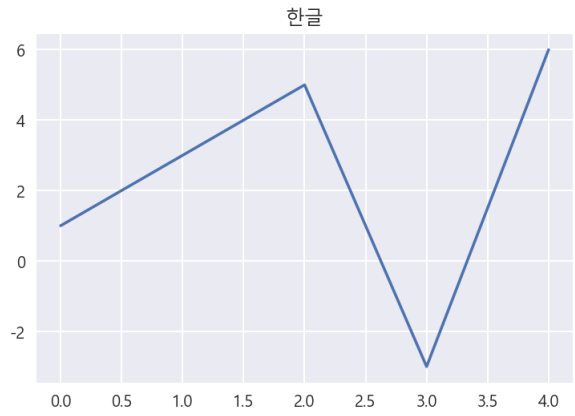
```
import matplotlib.pyplot as plt
import pandas as pd

def get_font_family():
    import platform
    system_name = platform.system()
    if system_name == "Darwin" :
        font_family = "AppleGothic"
    elif system_name == "Windows":
        font_family = "Malgun Gothic"
    elif system_name == "Linux":
        font_family = "NanumGothic"
    return font_family

font_family = get_font_family()
```

```
# 사용가능한 폰트 스타일
print(plt.style.available)

# 그래프 스타일 설정
plt.style.use('seaborn')

# 폰트설정
plt.rc("font", family=font_family)

# 마이너스폰트 설정
plt.rc('axes', unicode_minus=False)

# 그래프에 retina display 적용
%config InlineBackend.figure_format='retina'

plt.figure(figsize=(6,4))
# 한글폰트 확인
pd.Series([1,3,5,-3,6]).plot(title='한글')
```

```
['Solarize_Light2', '_classic_test_patch', '_mpl-gallery', '_mpl-gallery-nogrid', 'bmh', 'classic', 'dark_background', 'fast', 'fivethirtyeight', 'ggplot', 'grayscale', 'seaborn', 'seaborn-bright', 'seaborn-colorblind', 'seaborn-dark', 'seaborn-dark-palette', 'seaborn-darkgrid', 'seaborn-deep', 'seaborn-muted', 'seaborn-notebook', 'seaborn-paper', 'seaborn-pastel', 'seaborn-poster', 'seaborn-talk', 'seaborn-ticks', 'seaborn-white', 'seaborn-whitegrid', 'tableau-colorblind10']
```

Out[85]:

```
<AxesSubplot:title={'center':'한글'}>
```



데이터 불러오기

In [86]:

```
import pandas as pd

filepath = './data/stat_105701.xls'
df=pd.read_excel(filepath,sheet_name='Sheet0', header=2, index_col='Unnamed: 0').iloc[:2,:].T.astype('float')
df
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
<ipython-input-86-aa0127e88fe4> in <module>
      2
      3 filepath = './data/stat_105701.xls'
----> 4 df=pd.read_excel(filepath,sheet_name='Sheet0', header=2, index_col='Unnamed: 0').iloc[:2,:].T.astype('
float')
      5 df

C:\Dev\Miniconda\lib\site-packages\pandas\util\_decorators.py in wrapper(*args, **kwargs)
    309                     stacklevel=stacklevel,
    310                 )
--> 311             return func(*args, **kwargs)
    312
    313         return wrapper

C:\Dev\Miniconda\lib\site-packages\pandas\io\excel\_base.py in read_excel(io, sheet_name, header, names, index
_col, usecols, squeeze, dtype, engine, converters, true_values, false_values, skiprows, nrows, na_values, keep
_default_na, na_filter, verbose, parse_dates, date_parser, thousands, comment, skipfooter, convert_float, mang
le_dupe_cols, storage_options)
    362     if not isinstance(io, ExcelFile):
    363         should_close = True
--> 364         io = ExcelFile(io, storage_options=storage_options, engine=engine)
    365     elif engine and engine != io.engine:
    366         raise ValueError(

C:\Dev\Miniconda\lib\site-packages\pandas\io\excel\_base.py in __init__(self, path_or_buffer, engine, storage_
options)
   1231         self.storage_options = storage_options
   1232
-> 1233         self._reader = self._engines[engine](self._io, storage_options=storage_options)
   1234
   1235     def __fspath__(self):

C:\Dev\Miniconda\lib\site-packages\pandas\io\excel\_xlrd.py in __init__(self, filepath_or_buffer, storage_opti
ons)
     22         """
     23         err_msg = "Install xlrd >= 1.0.0 for Excel support"
---> 24         import_optional_dependency("xlrd", extra=err_msg)
     25         super().__init__(filepath_or_buffer, storage_options=storage_options)
     26

C:\Dev\Miniconda\lib\site-packages\pandas\compat\_optional.py in import_optional_dependency(name, extra, error
s, min_version)
    116     except ImportError:
    117         if errors == "raise":
--> 118             raise ImportError(msg) from None
    119         else:
    120             return None

ImportError: Missing optional dependency 'xlrd'. Install xlrd >= 1.0.0 for Excel support Use pip or conda to i
nstall xlrd.
```

데이터 전처리

- '월'을 15로 바꿔 주기 (매월 중순에 지수가 발표됨)

In [87]:

```
df.index=pd.to_datetime(df.index, format='%Y%m%d')
df
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in _to_datetime_with_format(arg, orig_arg, n
ame, tz, fmt, exact, errors, infer_datetime_format)
    508         try:
--> 509             values, tz = conversion.datetime_to_datetime64(arg)
    510             dta = DatetimeArray(values, dtype=tz_to_dtype(tz))

C:\Dev\Miniconda\lib\site-packages\pandas\_libs\tslibs\conversion.pyx in pandas._libs.tslibs.conversion.dateti
me_to_datetime64()

TypeError: Unrecognized value type: <class 'int'>

During handling of the above exception, another exception occurred:

ValueError                                Traceback (most recent call last)
<ipython-input-87-a8339dd3bdc4> in <module>
----> 1 df.index=pd.to_datetime(df.index, format='%Y%m%d')
      2 df

C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in to_datetime(arg, errors, dayfirst, yearfi
rst, utc, format, exact, unit, infer_datetime_format, origin, cache)
    894             result = _convert_and_box_cache(arg, cache_array, name=arg.name)
    895         else:
--> 896             result = convert_listlike(arg, format, name=arg.name)
    897     elif is_list_like(arg):
    898         try:

C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in _convert_listlike_datetimes(arg, format,
name, tz, unit, errors, infer_datetime_format, dayfirst, yearfirst, exact)
    392     if format is not None:
    393         res = _to_datetime_with_format(
--> 394             arg, orig_arg, name, tz, format, exact, errors, infer_datetime_format
    395         )
    396         if res is not None:

C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in _to_datetime_with_format(arg, orig_arg, n
ame, tz, fmt, exact, errors, infer_datetime_format)
    511             return DatetimeIndex._simple_new(dta, name=name)
    512         except (ValueError, TypeError):
--> 513             raise err
    514
    515

C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in _to_datetime_with_format(arg, orig_arg, n
ame, tz, fmt, exact, errors, infer_datetime_format)
    499         # fallback
    500         res = _array_strptime_with_fallback(
--> 501             arg, name, tz, fmt, exact, errors, infer_datetime_format
    502         )
    503         return res

C:\Dev\Miniconda\lib\site-packages\pandas\core\tools\datetimes.py in _array_strptime_with_fallback(arg, name,
tz, fmt, exact, errors, infer_datetime_format)
    434
    435     try:
--> 436         result, timezones = array_strptime(arg, fmt, exact=exact, errors=errors)
    437         if "%Z" in fmt or "%z" in fmt:
    438             return _return_parsed_timezone_results(result, timezones, tz, name)

C:\Dev\Miniconda\lib\site-packages\pandas\_libs\tslibs\strptime.pyx in pandas._libs.tslibs.strptime.array_strp
time()

ValueError: time data '0' does not match format '%Y%m%d' (match)
```

- index를 년-월-일 형식으로 변경

In [10]:

Out[10]:

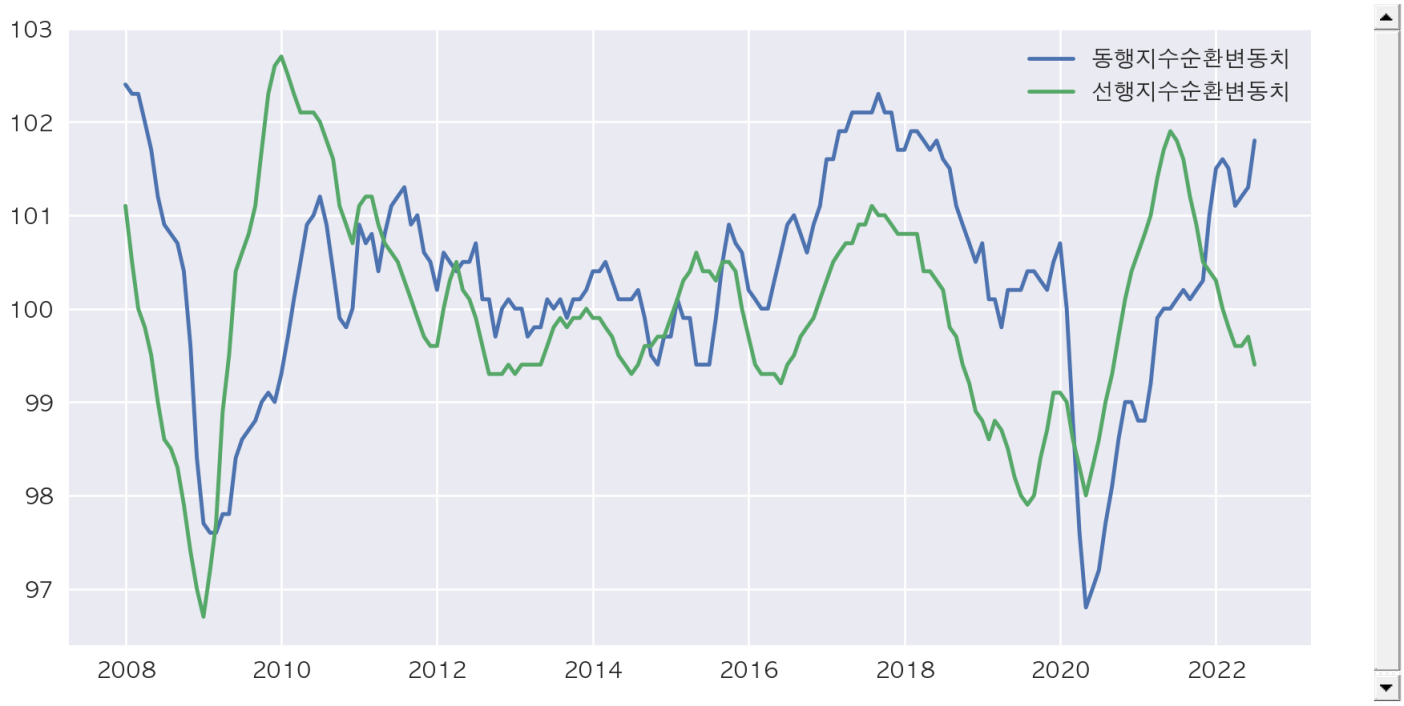
	동행지수순환변동치	선행지수순환변동치
2008-01-01	102.4	101.1
2008-02-01	102.3	100.5
2008-03-01	102.3	100.0
2008-04-01	102.0	99.8
2008-05-01	101.7	99.5
...	...	...
2022-03-01	101.5	99.8
2022-04-01	101.1	99.6
2022-05-01	101.2	99.6
2022-06-01	101.3	99.7
2022-07-01	101.8	99.4

175 rows × 2 columns

시각화 하기

- 2008년 1월 부터 2022년 7월 까지의 동행지수순환변동치 과 선행지수순환변동치 를 동시에 그리시오

In [7]:



보너스

- KOSPI와 함께 시각화 하기

In [1]:

```
# !pip install -U finance-datareader
```

In [6]:

```
import FinanceDataReader as fdr
import matplotlib.pyplot as plt
import pandas as pd

# 한국거래소 상장종목 전체
kospi = fdr.DataReader('KS11', '2008')
kospi.head()
```

Out[6]:

Date	Close	Open	High	Low	Volume	Change
2008-01-02	1853.45	1891.45	1892.50	1852.78	247090000.0	-0.0230
2008-01-03	1852.73	1834.44	1858.08	1821.61	253670000.0	-0.0004
2008-01-04	1863.90	1853.54	1869.76	1824.41	299080000.0	0.0060
2008-01-07	1831.14	1815.73	1840.99	1814.35	268130000.0	-0.0176
2008-01-08	1826.23	1838.64	1840.62	1818.69	296570000.0	-0.0027

In [13]: