In [4]:
```
# import the required libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [5]:
```
# import data
unitdata = pd.read_csv("C:\\Users\\oakin\\Documents\\Data Science Udemy\\Python Progra
```

In [6]:
```
# checking the data attibutes
type(unitdata)
```

Out[6]:
```
pandas.core.frame.DataFrame
```

In [7]:
```
unitdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 24 entries, 0 to 23
Data columns (total 6 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   hours      24 non-null     object
 1   FY2018/19  24 non-null     int64 
 2   FY2019/20  24 non-null     int64 
 3   FY2020/21  24 non-null     int64 
 4   FY2021/22  24 non-null     int64 
 5   Total      24 non-null     int64 
dtypes: int64(5), object(1)
memory usage: 1.2+ KB
```

In [8]:
```
unitdata.shape
```

Out[8]:
```
(24, 6)
```

In [9]:
```
unitdata.head()
```

Out[9]:

	hours	FY2018/19	FY2019/20	FY2020/21	FY2021/22	Total
0	0:00	4	1	7	5	17
1	1:00	4	4	5	4	17
2	2:00	4	9	3	5	21
3	3:00	2	6	3	1	12
4	4:00	6	5	1	8	20

In [16]:
```
# there is a need to convert hours column to time data
unitdata['time'] = pd.to_datetime(unitdata['hours'], format = '%H:%M').dt.hour     # t
# the hours are stored as integers in the field unitdata.time
```

In [17]:
```
unitdata.head()
```

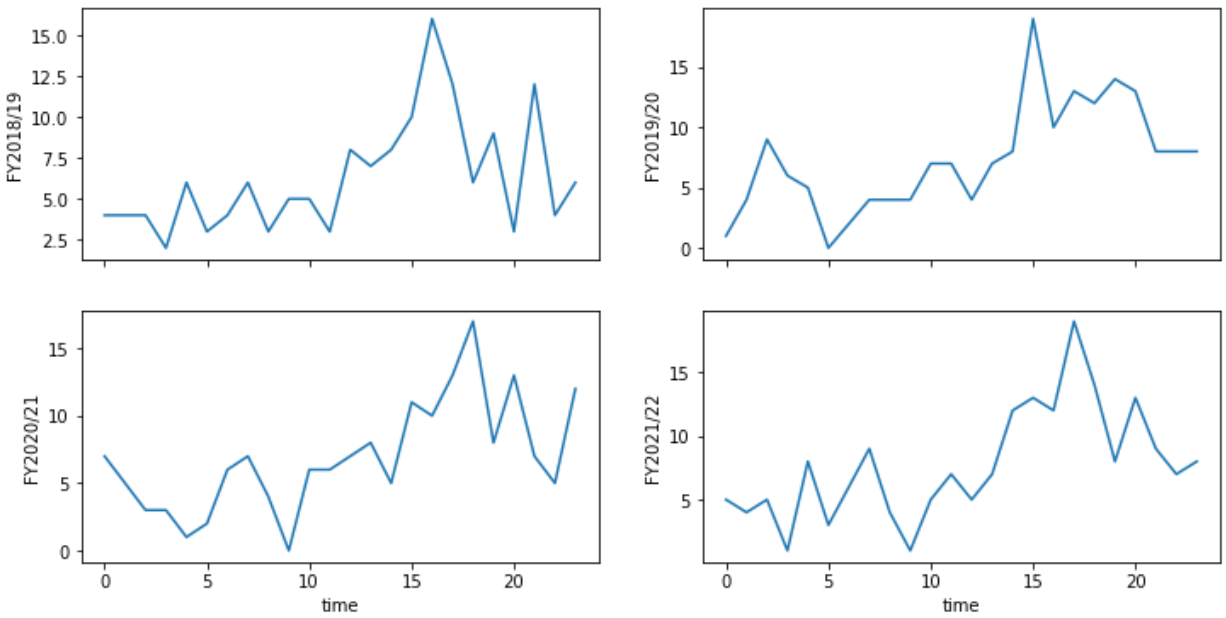
Out[17]:

	hours	FY2018/19	FY2019/20	FY2020/21	FY2021/22	Total	time
0	2022-10-14 00:00:00	4	1	7	5	17	0
1	2022-10-14 01:00:00	4	4	5	4	17	1
2	2022-10-14 02:00:00	4	9	3	5	21	2
3	2022-10-14 03:00:00	2	6	3	1	12	3
4	2022-10-14 04:00:00	6	5	1	8	20	4

In [18]:
```
unitdata.info()
```

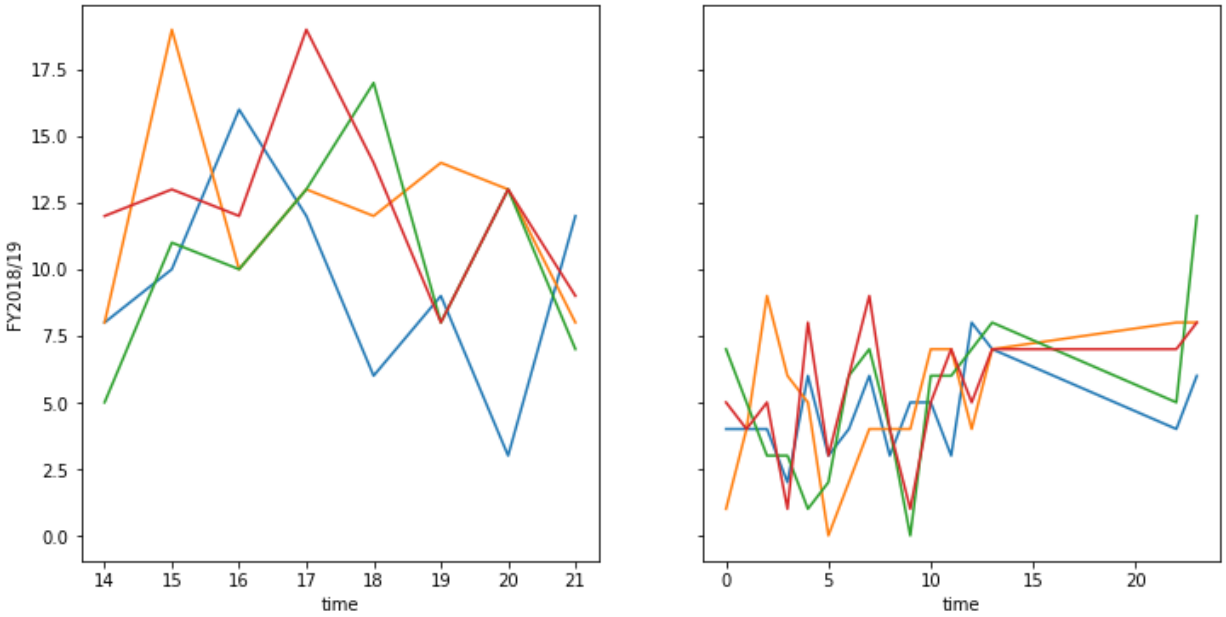
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 24 entries, 0 to 23
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype         
---  ------     --------------  -----         
 0   hours      24 non-null     datetime64[ns]
 1   FY2018/19  24 non-null     int64         
 2   FY2019/20  24 non-null     int64         
 3   FY2020/21  24 non-null     int64         
 4   FY2021/22  24 non-null     int64         
 5   Total      24 non-null     int64         
 6   time       24 non-null     int64         
dtypes: datetime64[ns](1), int64(6)
memory usage: 1.4 KB
```

In [36]:
```
f, axes = plt.subplots(2,2, figsize = (12,6), sharex = True)
p1 = sns.lineplot(data = unitdata, x='time',y='FY2018/19', ax = axes[0,0])
p2 = sns.lineplot(data = unitdata, x='time',y='FY2019/20', ax = axes[0,1])
p3 = sns.lineplot(data = unitdata, x='time',y='FY2020/21', ax = axes[1,0])
p4 = sns.lineplot(data = unitdata, x='time',y='FY2021/22', ax = axes[1,1])
```



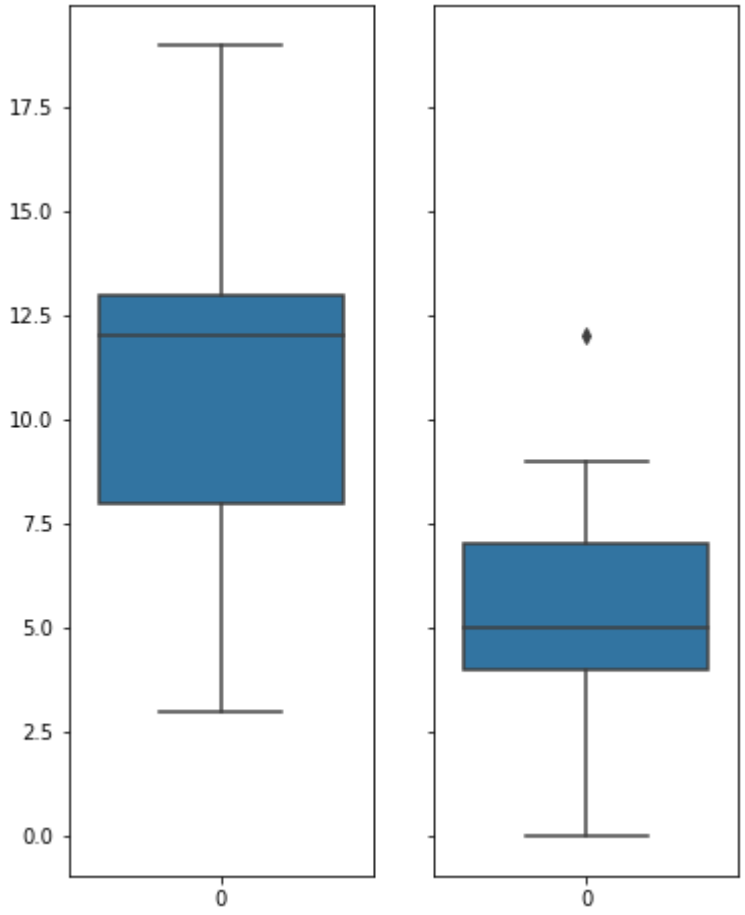
In [133…
```
# seprating the plots because it looks like some period have higher outcomes, period 1
f, axes = plt.subplots(1,2, figsize = (12,6), sharey = True)
p1 = sns.lineplot(data = unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)], x='t
p2 = sns.lineplot(data = unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)], x='t
p3 = sns.lineplot(data = unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)], x='t
```

```
p4 = sns.lineplot(data = unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)], x='t
p1b = sns.lineplot(data = unitdata[(unitdata.time < 14) | (unitdata.time > 21)], x='ti
p2b = sns.lineplot(data = unitdata[(unitdata.time < 14) | (unitdata.time > 21)], x='ti
p3b = sns.lineplot(data = unitdata[(unitdata.time < 14) | (unitdata.time > 21)], x='ti
p4b = sns.lineplot(data = unitdata[(unitdata.time < 14) | (unitdata.time > 21)], x='ti
```



In [236…

```
f, axes = plt.subplots(1,2, figsize = (6,8), sharey = True)
PL = sns.boxplot(data = LPeriod, ax = axes[1])
PH = sns.boxplot(data = HPeriod, ax = axes[0])
```



In [168…
```
# from the vissualizations, it seemes there is increase in the tthis variables betweer
# hours of the day
# lets separate the two periods
import warnings
warnings.filterwarnings('ignore')
HPeriod = pd.DataFrame()
LPeriod = pd.DataFrame()
HPeriod = unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)]['FY2018/19']
HPeriod = HPeriod.append(unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)]['FY20
HPeriod = HPeriod.append(unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)]['FY20
HPeriod = HPeriod.append(unitdata[(unitdata.time >= 14) & (unitdata.time <= 21)]['FY20

LPeriod = unitdata[(unitdata.time < 14) | (unitdata.time > 21)]['FY2018/19']
LPeriod = LPeriod.append(unitdata[(unitdata.time < 14) | (unitdata.time > 21)]['FY2019
LPeriod = LPeriod.append(unitdata[(unitdata.time < 14) | (unitdata.time > 21)]['FY2020
LPeriod = LPeriod.append(unitdata[(unitdata.time < 14) | (unitdata.time > 21)]['FY2021
```

In [237…
```
#Hypothesis test
#H-Null : HPeriod Mean = LPeriod Mean
#H-Alt: HPeriod MEan > LPeriod Mean
import scipy.stats as sc

p = sc.ttest_ind(HPeriod,LPeriod)
p
if p[1] <= 0.05:
    print('Reject Null Hypothesis'",p-vlaue=", p[1])
else:
    print('Accept Null Hypothesis'",p-vlaue=", p[1])
```

```
Reject Null Hypothesis,p-vlaue= 5.842681300831692e-16
```

In [232…
```
#------------End of Work------------
```