Course : B. Sc. (h) Computer Science

Year : III

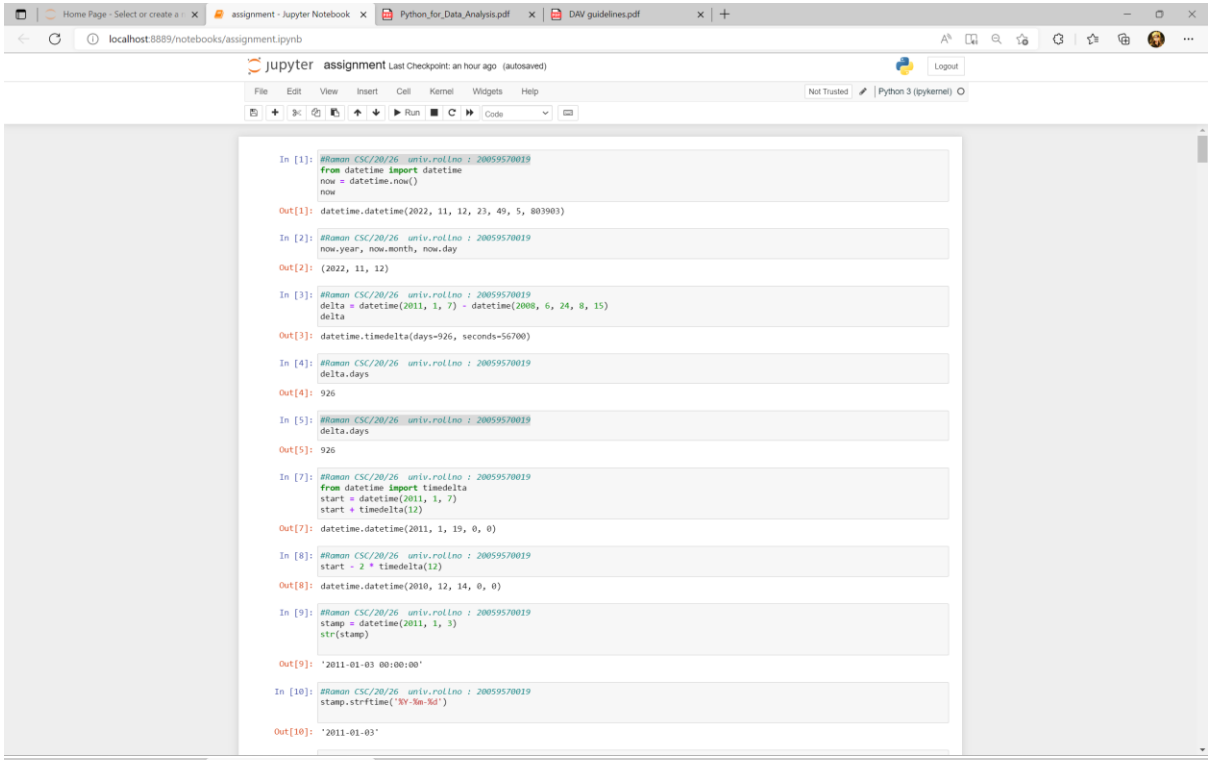
Semester : V

Name : RAMAN

College Rollno : CSC/20/26

University Rollno : 20059570019

DATA ANALYSIS AND VISUALISATION ASSIGNMENT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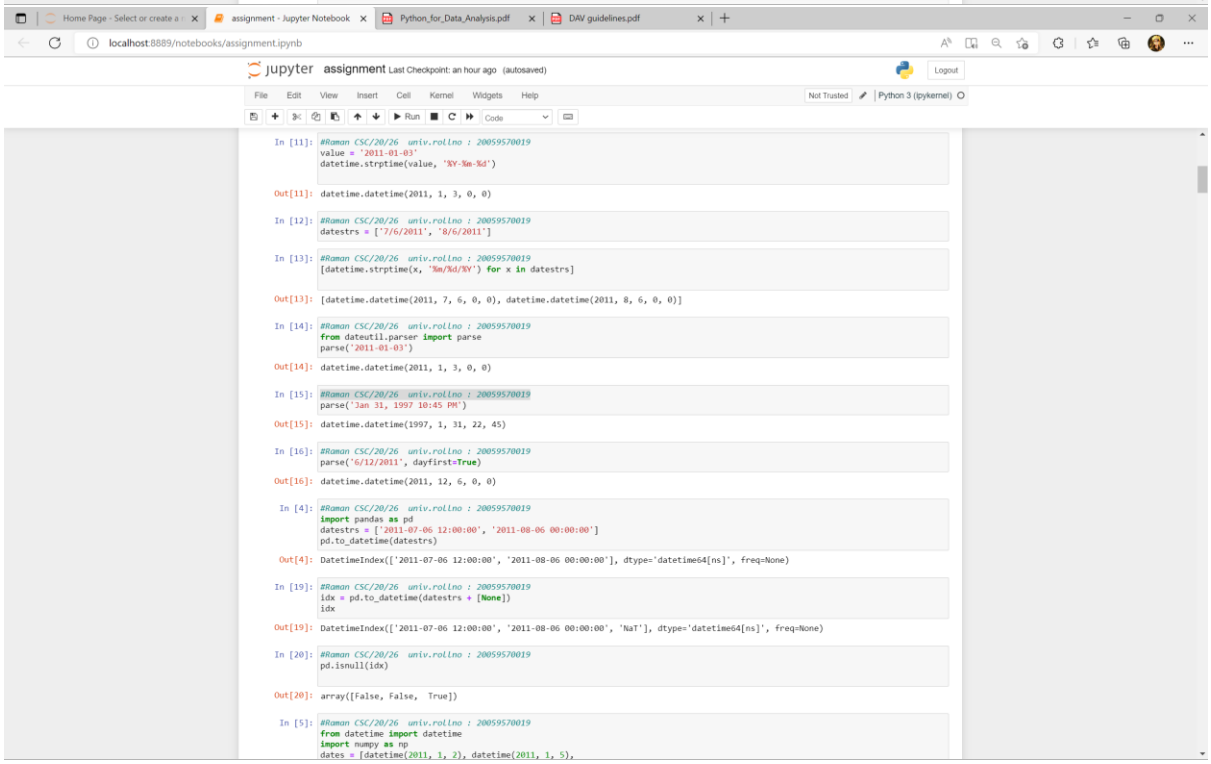
Not Trusted
Python 3 (ipykernel)
Run
Code
In [1]:
#Raman CSC/20/26 univ.rollno : 20059570019
from datetime import datetime
now = datetime.now()
now
Out[1]:
datetime.datetime(2022, 11, 12, 23, 49, 5, 803903)
In [2]:
#Raman CSC/20/26 univ.rollno : 20059570019
now.year, now.month, now.day
Out[2]:
(2022, 11, 12)
In [3]:
#Raman CSC/20/26 univ.rollno : 20059570019
delta = datetime(2011, 1, 7) - datetime(2008, 6, 24, 8, 15)
delta
Out[3]:
datetime.timedelta(days=926, seconds=56700)
In [4]:
#Raman CSC/20/26 univ.rollno : 20059570019
delta.days
Out[4]:
926
In [5]:
#Raman CSC/20/26 univ.rollno : 20059570019
delta.days
Out[5]:
926
In [7]:
#Raman CSC/20/26 univ.rollno : 20059570019
from datetime import timedelta
start = datetime(2011, 1, 7)
start + timedelta(12)
Out[7]:
datetime.datetime(2011, 1, 19, 0, 0)
In [8]:
#Raman CSC/20/26 univ.rollno : 20059570019
start - 2 * timedelta(12)
Out[8]:
datetime.datetime(2010, 12, 14, 0, 0)
In [9]:
#Raman CSC/20/26 univ.rollno : 20059570019
stamp = datetime(2011, 1, 3)
str(stamp)
Out[9]:
'2011-01-03 00:00:00'
In [10]:
#Raman CSC/20/26 univ.rollno : 20059570019
stamp.strftime('%Y-%m-%d')
Out[10]:
'2011-01-03'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Python 3 (ipykernel)
Run
Code
In [11]:
#Raman CSC/20/26 univ.rollno : 20059570019
value = '2011-01-03'
datetime.strptime(value, '%Y-%m-%d')
Out[11]:
datetime.datetime(2011, 1, 3, 0, 0)
In [12]:
#Raman CSC/20/26 univ.rollno : 20059570019
datestrs = ['7/6/2011', '8/6/2011']
In [13]:
#Raman CSC/20/26 univ.rollno : 20059570019
[datetime.strptime(x, '%m/%d/%Y') for x in datestrs]
Out[13]:
[datetime.datetime(2011, 7, 6, 0, 0), datetime.datetime(2011, 8, 6, 0, 0)]
In [14]:
#Raman CSC/20/26 univ.rollno : 20059570019
from dateutil.parser import parse
parse('2011-01-03')
Out[14]:
datetime.datetime(2011, 1, 3, 0, 0)
In [15]:
#Raman CSC/20/26 univ.rollno : 20059570019
parse('Jan 31, 1997 10:45 PM')
Out[15]:
datetime.datetime(1997, 1, 31, 22, 45)
In [16]:
#Raman CSC/20/26 univ.rollno : 20059570019
parse('6/12/2011', dayfirst=True)
Out[16]:
datetime.datetime(2011, 12, 6, 0, 0)
In [4]:
#Raman CSC/20/26 univ.rollno : 20059570019
import pandas as pd
datestrs = ['2011-07-06 12:00:00', '2011-08-06 00:00:00']
pd.to_datetime(datestrs)
Out[4]:
DatetimeIndex(['2011-07-06 12:00:00', '2011-08-06 00:00:00'], dtype='datetime64[ns]', freq=None)
In [19]:
#Raman CSC/20/26 univ.rollno : 20059570019
idx = pd.to_datetime(datestrs + [None])
idx
Out[19]:
DatetimeIndex(['2011-07-06 12:00:00', '2011-08-06 00:00:00', 'NaT'], dtype='datetime64[ns]', freq=None)
In [20]:
#Raman CSC/20/26 univ.rollno : 20059570019
pd.isnull(idx)
Out[20]:
array([False, False, True])
In [5]:
#Raman CSC/20/26 univ.rollno : 20059570019
from datetime import datetime
import numpy as np
dates = [datetime(2011, 1, 2), datetime(2011, 1, 5),

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Run | Code

In [5]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
from datetime import datetime
import numpy as np
dates = [datetime(2011, 1, 2), datetime(2011, 1, 5),
         datetime(2011, 1, 7), datetime(2011, 1, 8),
         datetime(2011, 1, 10), datetime(2011, 1, 12)]
ts = pd.Series(np.random.randn(6), index=dates)
ts
```

Out[5]:
```
2011-01-02    0.885373
2011-01-05   -1.655931
2011-01-07   -0.237656
2011-01-08    1.644941
2011-01-10    0.736143
2011-01-12    1.324334
dtype: float64
```

In [26]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.index
```

Out[26]:
```
DatetimeIndex(['2011-01-02', '2011-01-05', '2011-01-07', '2011-01-08',
               '2011-01-10', '2011-01-12'],
              dtype='datetime64[ns]', freq=None)
```

In [27]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts + ts[::2]
```

Out[27]:
```
2011-01-02    4.613536
2011-01-05         NaN
2011-01-07   -0.081833
2011-01-08         NaN
2011-01-10    2.884337
2011-01-12         NaN
dtype: float64
```

In [28]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.index.dtype
```

Out[28]:
```
dtype('<M8[ns]')
```

In [29]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
stamp = ts.index[0]
stamp
```

Out[29]:
```
Timestamp('2011-01-02 00:00:00')
```

In [30]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
stamp = ts.index[2]
ts[stamp]
```

Out[30]:
```
-0.040916544147718656
```

In [31]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts['1/10/2011']
```

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Run | Code

In [31]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts['1/10/2011']
```

Out[31]:
```
1.4421683564571326
```

In [32]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts['20110110']
```

Out[32]:
```
1.4421683564571326
```

In [33]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts['20110110']
```

Out[33]:
```
1.4421683564571326
```

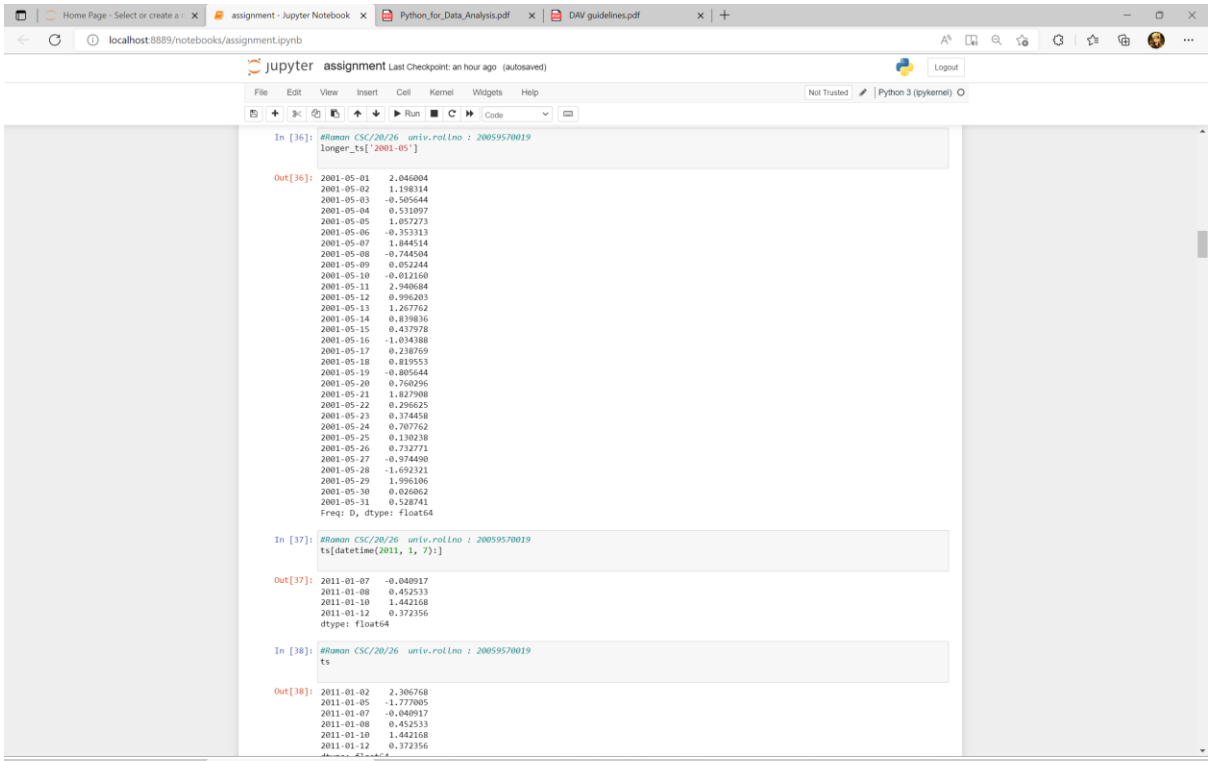
In [34]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
longer_ts = pd.Series(np.random.randn(1000),
                      index=pd.date_range('1/1/2000', periods=1000))
```

In [35]:
```
longer_ts
```

Out[35]:
```
2000-01-01    1.049202
2000-01-02    0.209673
2000-01-03   -1.076501
2000-01-04    0.221465
2000-01-05   -1.302065
                ...
2002-09-22    0.357160
2002-09-23   -0.725265
2002-09-24   -0.932222
2002-09-25    0.472131
2002-09-26    1.547671
Freq: D, Length: 1000, dtype: float64
```

In [36]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
longer_ts['2001-05']
```

Out[36]:
```
2001-05-01    2.046004
2001-05-02    1.198314
2001-05-03   -0.505644
2001-05-04    0.531097
2001-05-05    1.057273
2001-05-06   -0.353313
2001-05-07    1.844514
2001-05-08   -0.744504
2001-05-09    0.052244
2001-05-10   -0.012160
2001-05-11    2.940684
2001-05-12    0.996203
2001-05-13    1.267762
```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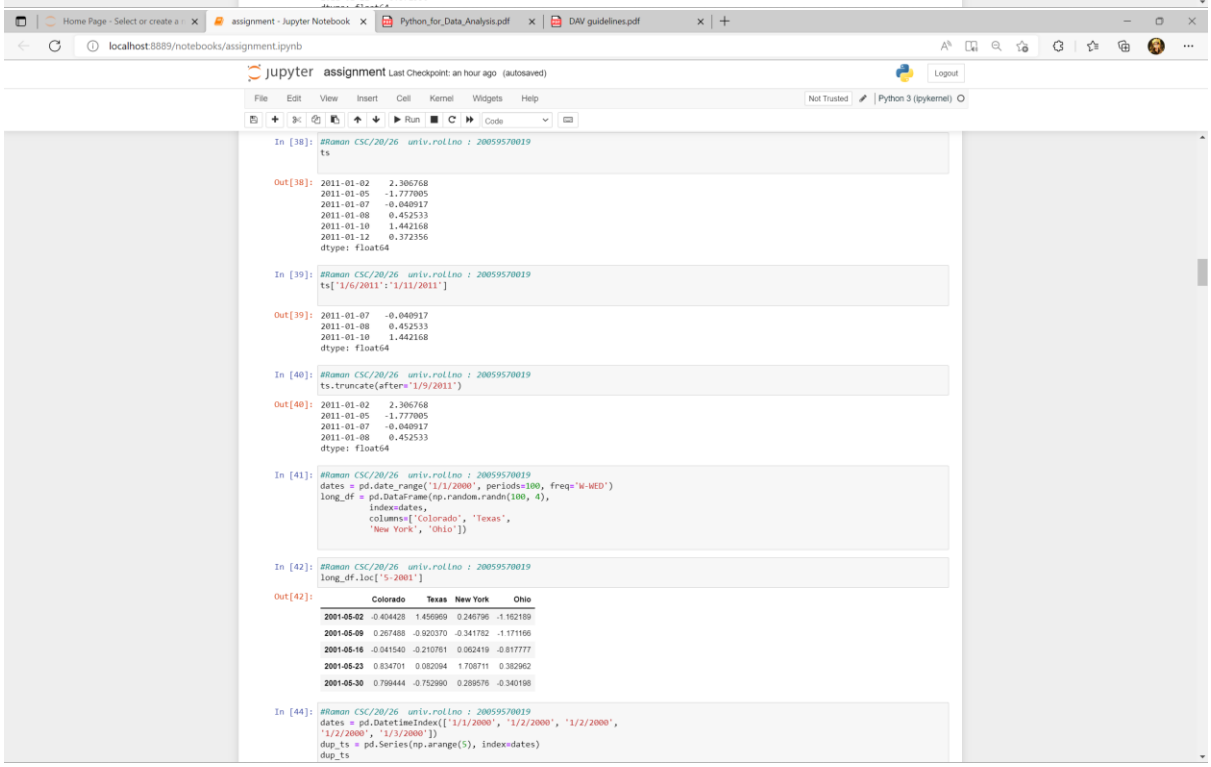
Python 3 (ipykernel)
Run
Code
In [36]:
#Raman CSC/20/26 univ.rollno : 20059570019
longer_ts['2001-05']
Out[36]:
2001-05-01 2.046004
2001-05-02 1.198314
2001-05-03 -0.505644
2001-05-04 0.531097
2001-05-05 1.057273
2001-05-06 -0.353313
2001-05-07 1.844514
2001-05-08 -0.744504
2001-05-09 0.052244
2001-05-10 -0.012160
2001-05-11 2.940684
2001-05-12 0.996203
2001-05-13 1.267762
2001-05-14 0.839836
2001-05-15 0.437978
2001-05-16 -1.034388
2001-05-17 0.238769
2001-05-18 0.819553
2001-05-19 -0.805644
2001-05-20 0.760296
2001-05-21 1.827908
2001-05-22 0.296625
2001-05-23 0.374458
2001-05-24 0.707762
2001-05-25 0.130238
2001-05-26 0.732771
2001-05-27 -0.974490
2001-05-28 -1.692321
2001-05-29 1.996106
2001-05-30 0.026062
2001-05-31 0.528741
Freq: D, dtype: float64
In [37]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts[datetime(2011, 1, 7):]
Out[37]:
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168
2011-01-12 0.372356
dtype: float64
In [38]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[38]:
2011-01-02 2.306768
2011-01-05 -1.777005
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168
2011-01-12 0.372356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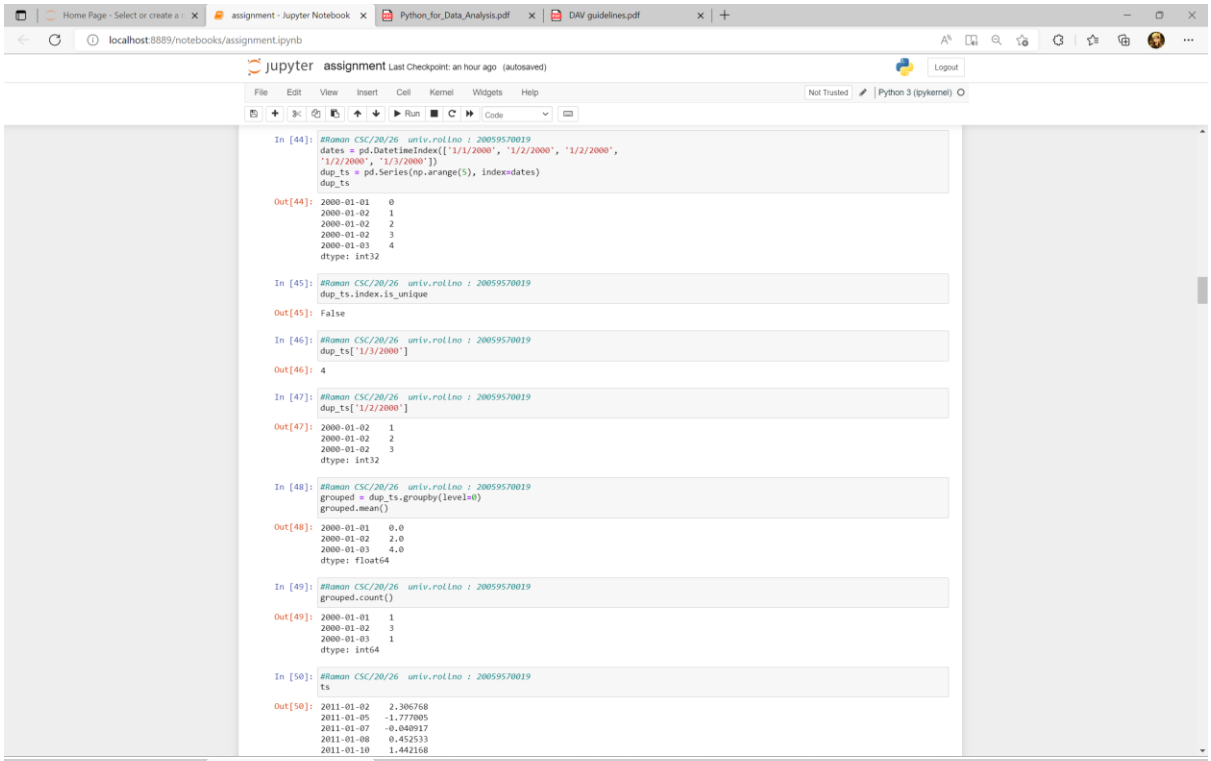
Python 3 (ipykernel)
Run
Code
In [38]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[38]:
2011-01-02 2.306768
2011-01-05 -1.777005
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168
2011-01-12 0.372356
dtype: float64
In [39]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts['1/6/2011':'1/11/2011']
Out[39]:
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168
dtype: float64
In [40]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.truncate(after='1/9/2011')
Out[40]:
2011-01-02 2.306768
2011-01-05 -1.777005
2011-01-07 -0.040917
2011-01-08 0.452533
dtype: float64
In [41]:
#Raman CSC/20/26 univ.rollno : 20059570019
dates = pd.date_range('1/1/2000', periods=100, freq='W-WED')
long_df = pd.DataFrame(np.random.randn(100, 4),
index=dates,
columns=['Colorado', 'Texas',
'New York', 'Ohio'])
In [42]:
#Raman CSC/20/26 univ.rollno : 20059570019
long_df.loc['5-2001']
Out[42]:
Colorado Texas New York Ohio
2001-05-02 -0.404428 1.456969 0.246796 -1.162189
2001-05-09 0.267488 -0.920370 -0.341782 -1.171166
2001-05-16 -0.041540 -0.210761 0.062419 -0.817777
2001-05-23 0.834701 0.082094 1.708711 0.382962
2001-05-30 0.799444 -0.752990 0.289576 -0.340198
In [44]:
#Raman CSC/20/26 univ.rollno : 20059570019
dates = pd.DatetimeIndex(['1/1/2000', '1/2/2000', '1/2/2000',
'1/2/2000', '1/3/2000'])
dup_ts = pd.Series(np.arange(5), index=dates)
dup_ts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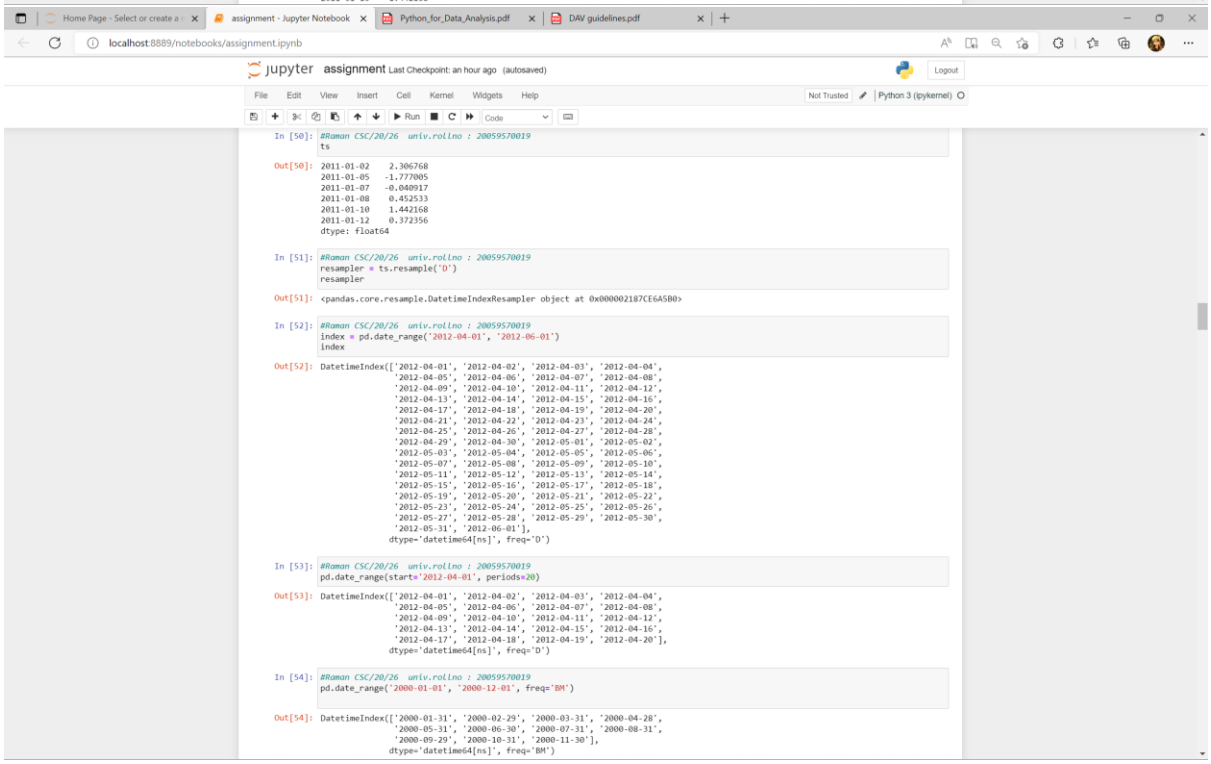
Python 3 (ipykernel)
Run
Code
In [44]:
#Raman CSC/20/26 univ.rollno : 20059570019
dates = pd.DatetimeIndex(['1/1/2000', '1/2/2000', '1/2/2000',
'1/2/2000', '1/3/2000'])
dup_ts = pd.Series(np.arange(5), index=dates)
dup_ts
Out[44]:
2000-01-01 0
2000-01-02 1
2000-01-02 2
2000-01-02 3
2000-01-03 4
dtype: int32
In [45]:
#Raman CSC/20/26 univ.rollno : 20059570019
dup_ts.index.is_unique
Out[45]:
False
In [46]:
#Raman CSC/20/26 univ.rollno : 20059570019
dup_ts['1/3/2000']
Out[46]:
4
In [47]:
#Raman CSC/20/26 univ.rollno : 20059570019
dup_ts['1/2/2000']
Out[47]:
2000-01-02 1
2000-01-02 2
2000-01-02 3
dtype: int32
In [48]:
#Raman CSC/20/26 univ.rollno : 20059570019
grouped = dup_ts.groupby(level=0)
grouped.mean()
Out[48]:
2000-01-01 0.0
2000-01-02 2.0
2000-01-03 4.0
dtype: float64
In [49]:
#Raman CSC/20/26 univ.rollno : 20059570019
grouped.count()
Out[49]:
2000-01-01 1
2000-01-02 3
2000-01-03 1
dtype: int64
In [50]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[50]:
2011-01-02 2.306768
2011-01-05 -1.777005
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168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Python 3 (ipykernel)
Run
Code
In [50]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[50]:
2011-01-02 2.306768
2011-01-05 -1.777005
2011-01-07 -0.040917
2011-01-08 0.452533
2011-01-10 1.442168
2011-01-12 0.372356
dtype: float64
In [51]:
#Raman CSC/20/26 univ.rollno : 20059570019
resampler = ts.resample('D')
resampler
Out[51]:
<pandas.core.resample.DatetimeIndexResampler object at 0x000002187CE6A5B0>
In [52]:
#Raman CSC/20/26 univ.rollno : 20059570019
index = pd.date_range('2012-04-01', '2012-06-01')
index
Out[52]:
DatetimeIndex(['2012-04-01', '2012-04-02', '2012-04-03', '2012-04-04',
'2012-04-05', '2012-04-06', '2012-04-07', '2012-04-08',
'2012-04-09', '2012-04-10', '2012-04-11', '2012-04-12',
'2012-04-13', '2012-04-14', '2012-04-15', '2012-04-16',
'2012-04-17', '2012-04-18', '2012-04-19', '2012-04-20',
'2012-04-21', '2012-04-22', '2012-04-23', '2012-04-24',
'2012-04-25', '2012-04-26', '2012-04-27', '2012-04-28',
'2012-04-29', '2012-04-30', '2012-05-01', '2012-05-02',
'2012-05-03', '2012-05-04', '2012-05-05', '2012-05-06',
'2012-05-07', '2012-05-08', '2012-05-09', '2012-05-10',
'2012-05-11', '2012-05-12', '2012-05-13', '2012-05-14',
'2012-05-15', '2012-05-16', '2012-05-17', '2012-05-18',
'2012-05-19', '2012-05-20', '2012-05-21', '2012-05-22',
'2012-05-23', '2012-05-24', '2012-05-25', '2012-05-26',
'2012-05-27', '2012-05-28', '2012-05-29', '2012-05-30',
'2012-05-31', '2012-06-01'],
dtype='datetime64[ns]', freq='D')
In [53]:
#Raman CSC/20/26 univ.rollno : 20059570019
pd.date_range(start='2012-04-01', periods=20)
Out[53]:
DatetimeIndex(['2012-04-01', '2012-04-02', '2012-04-03', '2012-04-04',
'2012-04-05', '2012-04-06', '2012-04-07', '2012-04-08',
'2012-04-09', '2012-04-10', '2012-04-11', '2012-04-12',
'2012-04-13', '2012-04-14', '2012-04-15', '2012-04-16',
'2012-04-17', '2012-04-18', '2012-04-19', '2012-04-20'],
dtype='datetime64[ns]', freq='D')
In [54]:
#Raman CSC/20/26 univ.rollno : 20059570019
pd.date_range('2000-01-01', '2000-12-01', freq='BM')
Out[54]:
DatetimeIndex(['2000-01-31', '2000-02-29', '2000-03-31', '2000-04-28',
'2000-05-31', '2000-06-30', '2000-07-31', '2000-08-31',
'2000-09-29', '2000-10-31', '2000-11-30'],
dtype='datetime64[ns]', freq='BM')

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Run Code

In [55]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
pd.date_range('2012-05-02 12:56:31', periods=5)
```

Out[55]:
```
DatetimeIndex(['2012-05-02 12:56:31', '2012-05-03 12:56:31',
               '2012-05-04 12:56:31', '2012-05-05 12:56:31',
               '2012-05-06 12:56:31'],
              dtype='datetime64[ns]', freq='D')
```

In [56]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
pd.date_range('2012-05-02 12:56:31', periods=5, normalize=True)
```

Out[56]:
```
DatetimeIndex(['2012-05-02', '2012-05-03', '2012-05-04', '2012-05-05',
               '2012-05-06'],
              dtype='datetime64[ns]', freq='D')
```

In [57]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
from pandas.tseries.offsets import Hour, Minute
hour = Hour()
hour
```

Out[57]:
```
<Hour>
```

In [58]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
four_hours = Hour(4)
four_hours
```

Out[58]:
```
<4 * Hours>
```

In [59]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
pd.date_range('2000-01-01', '2000-01-03 23:59', freq='4h')
```

Out[59]:
```
DatetimeIndex(['2000-01-01 00:00:00', '2000-01-01 04:00:00',
               '2000-01-01 08:00:00', '2000-01-01 12:00:00',
               '2000-01-01 16:00:00', '2000-01-01 20:00:00',
               '2000-01-02 00:00:00', '2000-01-02 04:00:00',
               '2000-01-02 08:00:00', '2000-01-02 12:00:00',
               '2000-01-02 16:00:00', '2000-01-02 20:00:00',
               '2000-01-03 00:00:00', '2000-01-03 04:00:00',
               '2000-01-03 08:00:00', '2000-01-03 12:00:00',
               '2000-01-03 16:00:00', '2000-01-03 20:00:00'],
              dtype='datetime64[ns]', freq='4H')
```

In [60]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
Hour(2) + Minute(30)
```

Out[60]:
```
<150 * Minutes>
```

In [61]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
pd.date_range('2000-01-01', periods=10, freq='1h30min')
```

Out[61]:
```
DatetimeIndex(['2000-01-01 00:00:00', '2000-01-01 01:30:00',
               '2000-01-01 03:00:00', '2000-01-01 04:30:00',
               '2000-01-01 06:00:00', '2000-01-01 07:30:00',
               '2000-01-01 09:00:00', '2000-01-01 10:30:00',
               '2000-01-01 12:00:00', '2000-01-01 13:30:00'],
```

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In [63]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
rng = pd.date_range('2012-01-01', '2012-09-01', freq='WOM-3FRI')
list(rng)
```

Out[63]:
```
[Timestamp('2012-01-20 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-02-17 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-03-16 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-04-20 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-05-18 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-06-15 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-07-20 00:00:00', freq='WOM-3FRI'),
 Timestamp('2012-08-17 00:00:00', freq='WOM-3FRI')]
```

In [66]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts =pd.Series(np.random.randn(4),
index=pd.date_range('1/1/2000', periods=4, freq='M'))
ts
```

Out[66]:
```
2000-01-31    0.417271
2000-02-29    1.847993
2000-03-31   -0.874496
2000-04-30   -0.184327
Freq: M, dtype: float64
```

In [67]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.shift(2)
```

Out[67]:
```
2000-01-31         NaN
2000-02-29         NaN
2000-03-31    0.417271
2000-04-30    1.847993
Freq: M, dtype: float64
```

In [68]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.shift(-2)
```

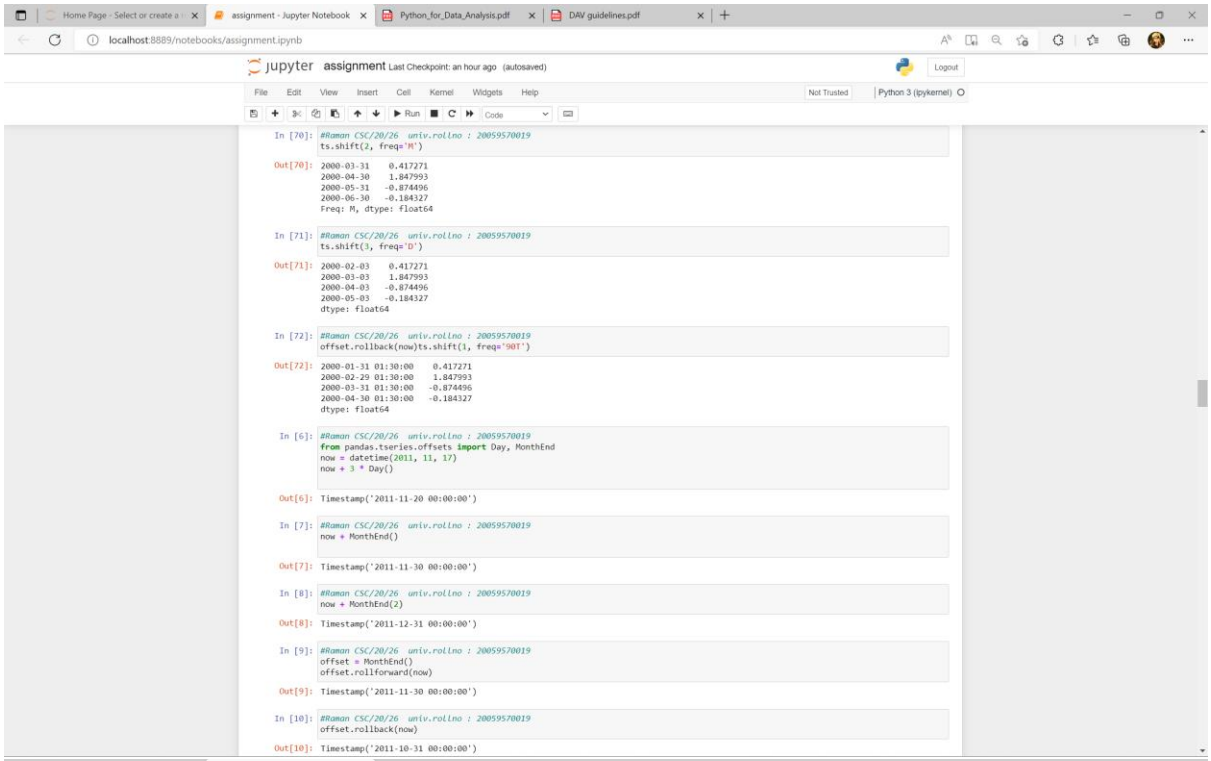
Out[68]:
```
2000-01-31   -0.874496
2000-02-29   -0.184327
2000-03-31         NaN
2000-04-30         NaN
Freq: M, dtype: float64
```

In [69]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts / ts.shift(1) - 1
```

Out[69]:
```
2000-01-31         NaN
2000-02-29    3.428761
2000-03-31   -1.473214
2000-04-30   -0.789219
Freq: M, dtype: float64
```

In [70]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.shift(2, freq='M')
```

Out[70]:
```
2000-03-31    0.417271
2000-04-30    1.847993
```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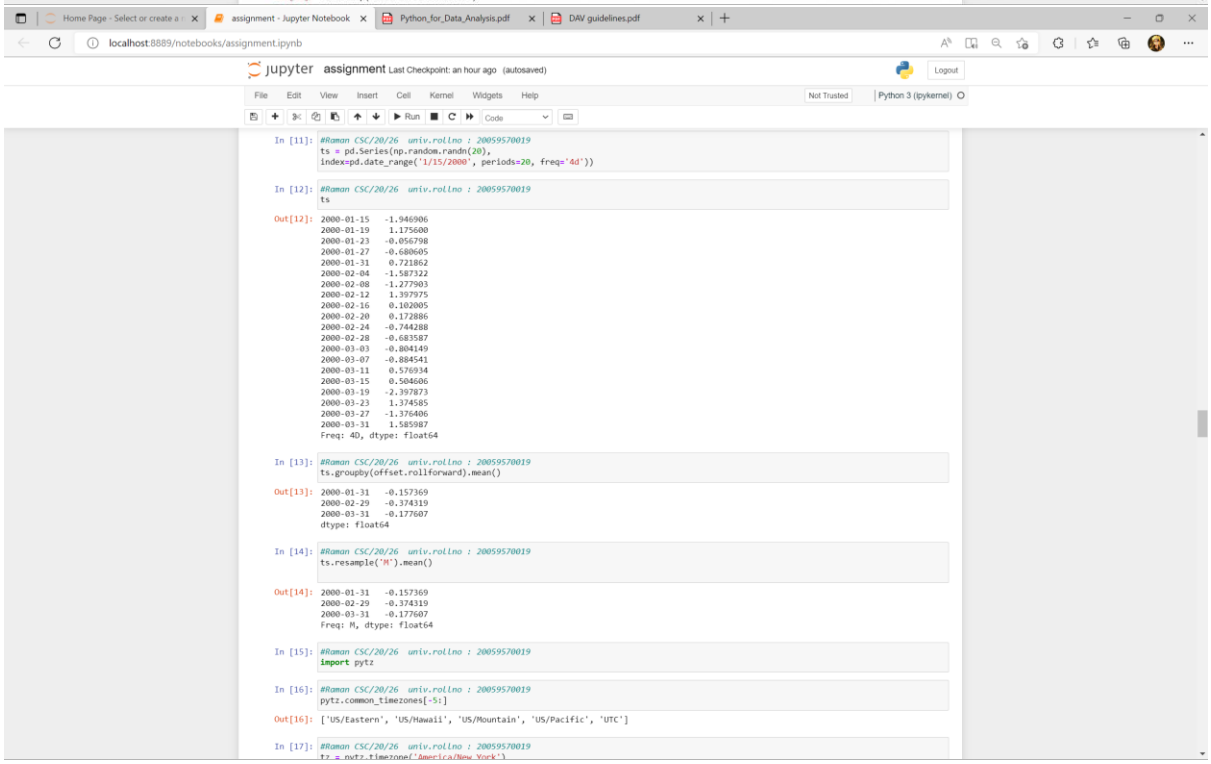
Python 3 (ipykernel)
Run
Code
In [70]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.shift(2, freq='M')
Out[70]:
2000-03-31 0.417271
2000-04-30 1.847993
2000-05-31 -0.874496
2000-06-30 -0.184327
Freq: M, dtype: float64
In [71]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.shift(3, freq='D')
Out[71]:
2000-02-03 0.417271
2000-03-03 1.847993
2000-04-03 -0.874496
2000-05-03 -0.184327
dtype: float64
In [72]:
#Raman CSC/20/26 univ.rollno : 20059570019
offset.rollback(now)ts.shift(1, freq='90T')
Out[72]:
2000-01-31 01:30:00 0.417271
2000-02-29 01:30:00 1.847993
2000-03-31 01:30:00 -0.874496
2000-04-30 01:30:00 -0.184327
dtype: float64
In [6]:
#Raman CSC/20/26 univ.rollno : 20059570019
from pandas.tseries.offsets import Day, MonthEnd
now = datetime(2011, 11, 17)
now + 3 * Day()
Out[6]:
Timestamp('2011-11-20 00:00:00')
In [7]:
#Raman CSC/20/26 univ.rollno : 20059570019
now + MonthEnd()
Out[7]:
Timestamp('2011-11-30 00:00:00')
In [8]:
#Raman CSC/20/26 univ.rollno : 20059570019
now + MonthEnd(2)
Out[8]:
Timestamp('2011-12-31 00:00:00')
In [9]:
#Raman CSC/20/26 univ.rollno : 20059570019
offset = MonthEnd()
offset.rollforward(now)
Out[9]:
Timestamp('2011-11-30 00:00:00')
In [10]:
#Raman CSC/20/26 univ.rollno : 20059570019
offset.rollback(now)
Out[10]:
Timestamp('2011-10-31 00:00:00')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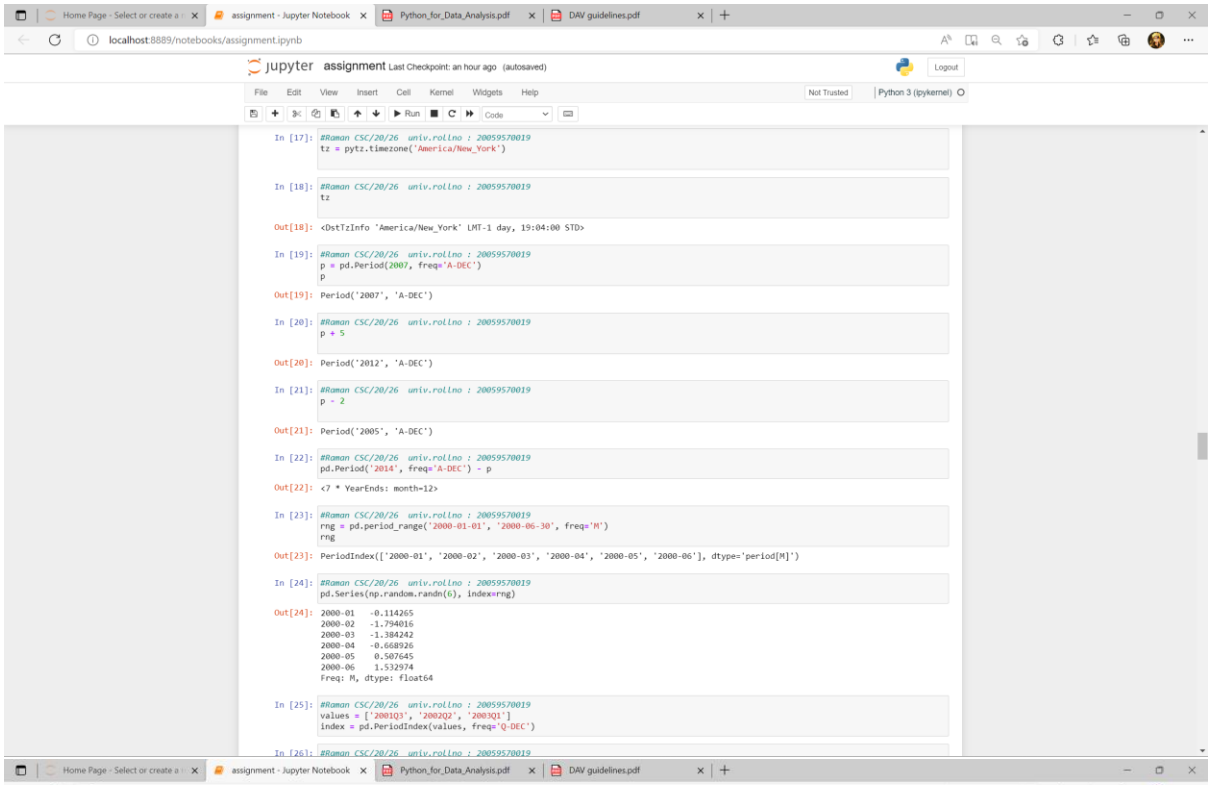
Python 3 (ipykernel)
Run
Code
In [11]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts = pd.Series(np.random.randn(20),
index=pd.date_range('1/15/2000', periods=20, freq='4d'))
In [12]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[12]:
2000-01-15 -1.946906
2000-01-19 1.175600
2000-01-23 -0.056798
2000-01-27 -0.680605
2000-01-31 0.721862
2000-02-04 -1.587322
2000-02-08 -1.277903
2000-02-12 1.397975
2000-02-16 0.102005
2000-02-20 0.172886
2000-02-24 -0.744288
2000-02-28 -0.683587
2000-03-03 -0.804149
2000-03-07 -0.884541
2000-03-11 0.576934
2000-03-15 0.504606
2000-03-19 -2.397873
2000-03-23 1.374585
2000-03-27 -1.376406
2000-03-31 1.585987
Freq: 4D, dtype: float64
In [13]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.groupby(offset.rollforward).mean()
Out[13]:
2000-01-31 -0.157369
2000-02-29 -0.374319
2000-03-31 -0.177607
dtype: float64
In [14]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('M').mean()
Out[14]:
2000-01-31 -0.157369
2000-02-29 -0.374319
2000-03-31 -0.177607
Freq: M, dtype: float64
In [15]:
#Raman CSC/20/26 univ.rollno : 20059570019
import pytz
In [16]:
#Raman CSC/20/26 univ.rollno : 20059570019
pytz.common_timezones[-5:]
Out[16]:
['US/Eastern', 'US/Hawaii', 'US/Mountain', 'US/Pacific', 'UTC']
In [17]:
#Raman CSC/20/26 univ.rollno : 20059570019
tz = pytz.timezone('America/New_York')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Python 3 (ipykernel)
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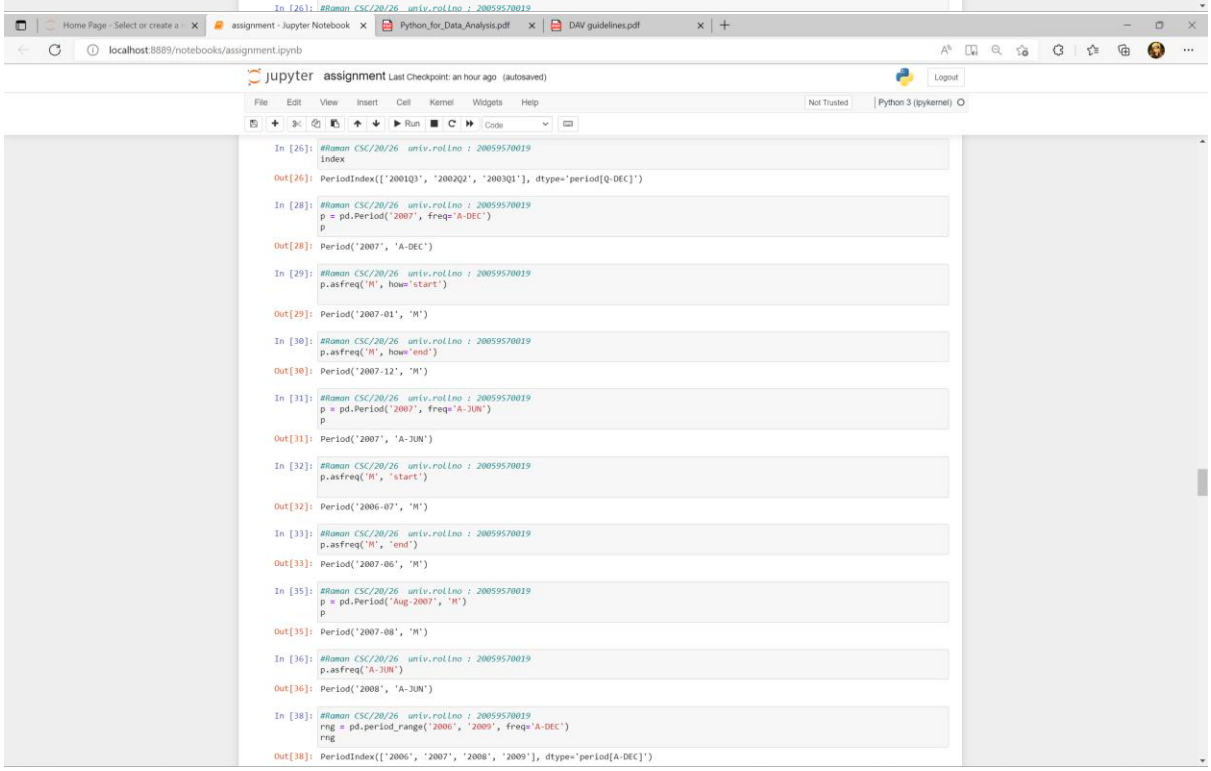
Code
In [17]: #Raman CSC/20/26 univ.rollno : 20059570019
tz = pytz.timezone('America/New_York')
In [18]: #Raman CSC/20/26 univ.rollno : 20059570019
tz
Out[18]: <DstTzInfo 'America/New_York' LMT-1 day, 19:04:00 STD>
In [19]: #Raman CSC/20/26 univ.rollno : 20059570019
p = pd.Period(2007, freq='A-DEC')
p
Out[19]: Period('2007', 'A-DEC')
In [20]: #Raman CSC/20/26 univ.rollno : 20059570019
p + 5
Out[20]: Period('2012', 'A-DEC')
In [21]: #Raman CSC/20/26 univ.rollno : 20059570019
p - 2
Out[21]: Period('2005', 'A-DEC')
In [22]: #Raman CSC/20/26 univ.rollno : 20059570019
pd.Period('2014', freq='A-DEC') - p
Out[22]: <7 * YearEnds: month=12>
In [23]: #Raman CSC/20/26 univ.rollno : 20059570019
rng = pd.period_range('2000-01-01', '2000-06-30', freq='M')
rng
Out[23]: PeriodIndex(['2000-01', '2000-02', '2000-03', '2000-04', '2000-05', '2000-06'], dtype='period[M]')
In [24]: #Raman CSC/20/26 univ.rollno : 20059570019
pd.Series(np.random.randn(6), index=rng)
Out[24]: 2000-01 -0.114265
2000-02 -1.794016
2000-03 -1.384242
2000-04 -0.668926
2000-05 0.507645
2000-06 1.532974
Freq: M, dtype: float64
In [25]: #Raman CSC/20/26 univ.rollno : 20059570019
values = ['2001Q3', '2002Q2', '2003Q1']
index = pd.PeriodIndex(values, freq='Q-DEC')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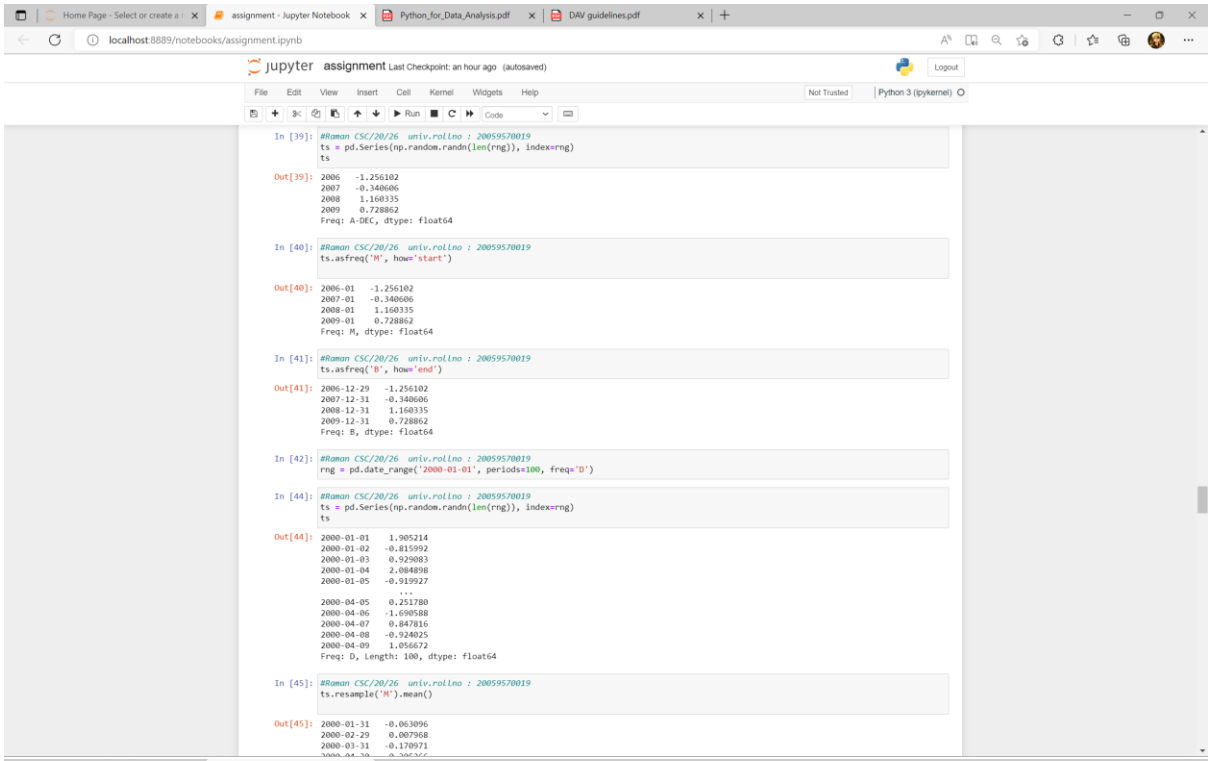
Python 3 (ipykernel)
Run
Code
In [26]: #Raman CSC/20/26 univ.rollno : 20059570019
index
Out[26]: PeriodIndex(['2001Q3', '2002Q2', '2003Q1'], dtype='period[Q-DEC]')
In [28]: #Raman CSC/20/26 univ.rollno : 20059570019
p = pd.Period('2007', freq='A-DEC')
p
Out[28]: Period('2007', 'A-DEC')
In [29]: #Raman CSC/20/26 univ.rollno : 20059570019
p.asfreq('M', how='start')
Out[29]: Period('2007-01', 'M')
In [30]: #Raman CSC/20/26 univ.rollno : 20059570019
p.asfreq('M', how='end')
Out[30]: Period('2007-12', 'M')
In [31]: #Raman CSC/20/26 univ.rollno : 20059570019
p = pd.Period('2007', freq='A-JUN')
p
Out[31]: Period('2007', 'A-JUN')
In [32]: #Raman CSC/20/26 univ.rollno : 20059570019
p.asfreq('M', 'start')
Out[32]: Period('2006-07', 'M')
In [33]: #Raman CSC/20/26 univ.rollno : 20059570019
p.asfreq('M', 'end')
Out[33]: Period('2007-06', 'M')
In [35]: #Raman CSC/20/26 univ.rollno : 20059570019
p = pd.Period('Aug-2007', 'M')
p
Out[35]: Period('2007-08', 'M')
In [36]: #Raman CSC/20/26 univ.rollno : 20059570019
p.asfreq('A-JUN')
Out[36]: Period('2008', 'A-JUN')
In [38]: #Raman CSC/20/26 univ.rollno : 20059570019
rng = pd.period_range('2006', '2009', freq='A-DEC')
rng
Out[38]: PeriodIndex(['2006', '2007', '2008', '2009'], dtype='period[A-DEC]')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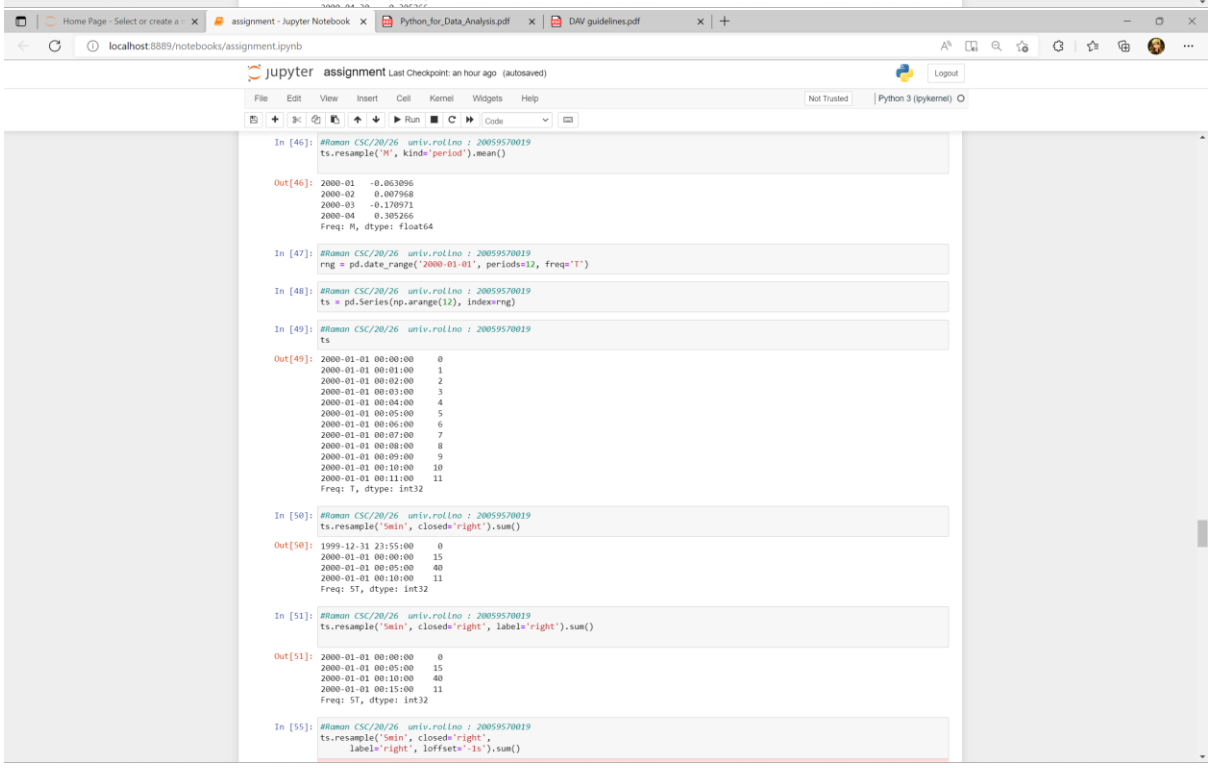
Python 3 (ipykernel)
Run
Code
In [39]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts = pd.Series(np.random.randn(len(rng)), index=rng)
ts
Out[39]:
2006 -1.256102
2007 -0.340606
2008 1.160335
2009 0.728862
Freq: A-DEC, dtype: float64
In [40]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.asfreq('M', how='start')
Out[40]:
2006-01 -1.256102
2007-01 -0.340606
2008-01 1.160335
2009-01 0.728862
Freq: M, dtype: float64
In [41]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.asfreq('B', how='end')
Out[41]:
2006-12-29 -1.256102
2007-12-31 -0.340606
2008-12-31 1.160335
2009-12-31 0.728862
Freq: B, dtype: float64
In [42]:
#Raman CSC/20/26 univ.rollno : 20059570019
rng = pd.date_range('2000-01-01', periods=100, freq='D')
In [44]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts = pd.Series(np.random.randn(len(rng)), index=rng)
ts
Out[44]:
2000-01-01 1.905214
2000-01-02 -0.815992
2000-01-03 0.929083
2000-01-04 2.084898
2000-01-05 -0.919927
...
2000-04-05 0.251780
2000-04-06 -1.690588
2000-04-07 0.847816
2000-04-08 -0.924025
2000-04-09 1.056672
Freq: D, Length: 100, dtype: float64
In [45]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('M').mean()
Out[45]:
2000-01-31 -0.063096
2000-02-29 0.007968
2000-03-31 -0.170971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Code
In [46]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('M', kind='period').mean()
Out[46]:
2000-01 -0.063096
2000-02 0.007968
2000-03 -0.170971
2000-04 0.305266
Freq: M, dtype: float64
In [47]:
#Raman CSC/20/26 univ.rollno : 20059570019
rng = pd.date_range('2000-01-01', periods=12, freq='T')
In [48]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts = pd.Series(np.arange(12), index=rng)
In [49]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts
Out[49]:
2000-01-01 00:00:00 0
2000-01-01 00:01:00 1
2000-01-01 00:02:00 2
2000-01-01 00:03:00 3
2000-01-01 00:04:00 4
2000-01-01 00:05:00 5
2000-01-01 00:06:00 6
2000-01-01 00:07:00 7
2000-01-01 00:08:00 8
2000-01-01 00:09:00 9
2000-01-01 00:10:00 10
2000-01-01 00:11:00 11
Freq: T, dtype: int32
In [50]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('5min', closed='right').sum()
Out[50]:
1999-12-31 23:55:00 0
2000-01-01 00:00:00 15
2000-01-01 00:05:00 40
2000-01-01 00:10:00 11
Freq: 5T, dtype: int32
In [51]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('5min', closed='right', label='right').sum()
Out[51]:
2000-01-01 00:00:00 0
2000-01-01 00:05:00 15
2000-01-01 00:10:00 40
2000-01-01 00:15:00 11
Freq: 5T, dtype: int32
In [55]:
#Raman CSC/20/26 univ.rollno : 20059570019
ts.resample('5min', closed='right',
label='right', loffset='-1s').sum()

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In [55]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.resample('5min', closed='right',
            label='right', loffset='-1s').sum()
```

```
C:\Users\raman\AppData\Local\Temp\ipykernel_15092\1438149062.py:1: FutureWarning: 'loffset' in .resample() and in Grouper() is deprecated.

>>> df.resample(freq="3s", loffset="8H")

becomes:

>>> from pandas.tseries.frequencies import to_offset
>>> df = df.resample(freq="3s").mean()
>>> df.index = df.index.to_timestamp() + to_offset("8H")

  ts.resample('5min', closed='right',
```

Out[55]:
```
1999-12-31 23:59:59     0
2000-01-01 00:04:59    15
2000-01-01 00:09:59    40
2000-01-01 00:14:59    11
Freq: 5T, dtype: int32
```

In [56]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ts.resample('5min').ohlc()
```

Out[56]:

	open	high	low	close
2000-01-01 00:00:00	0	4	0	4
2000-01-01 00:05:00	5	9	5	9
2000-01-01 00:10:00	10	11	10	11

In [57]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame = pd.DataFrame(np.random.randn(2, 4),
 index=pd.date_range('1/1/2000', periods=2,
 freq='W-WED'),
 columns=['Colorado', 'Texas', 'New York', 'Ohio'])
```

In [58]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame
```

Out[58]:

	Colorado	Texas	New York	Ohio
2000-01-05	0.838612	0.412967	-0.847606	-0.104561
2000-01-12	0.772818	0.255985	0.479449	0.173479

In [59]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
df_daily = frame.resample('D').asfreq()
df_daily
```

Out[59]:

	Colorado	Texas	New York	Ohio
2000-01-05	0.838612	0.412967	-0.847606	-0.104561
2000-01-06	NaN	NaN	NaN	NaN
2000-01-07	NaN	NaN	NaN	NaN
2000-01-08	NaN	NaN	NaN	NaN
2000-01-09	NaN	NaN	NaN	NaN
2000-01-10	NaN	NaN	NaN	NaN
2000-01-11	NaN	NaN	NaN	NaN
2000-01-12	0.772818	0.255985	0.479449	0.173479

In [60]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame.resample('D').ffill()
```

Out[60]:

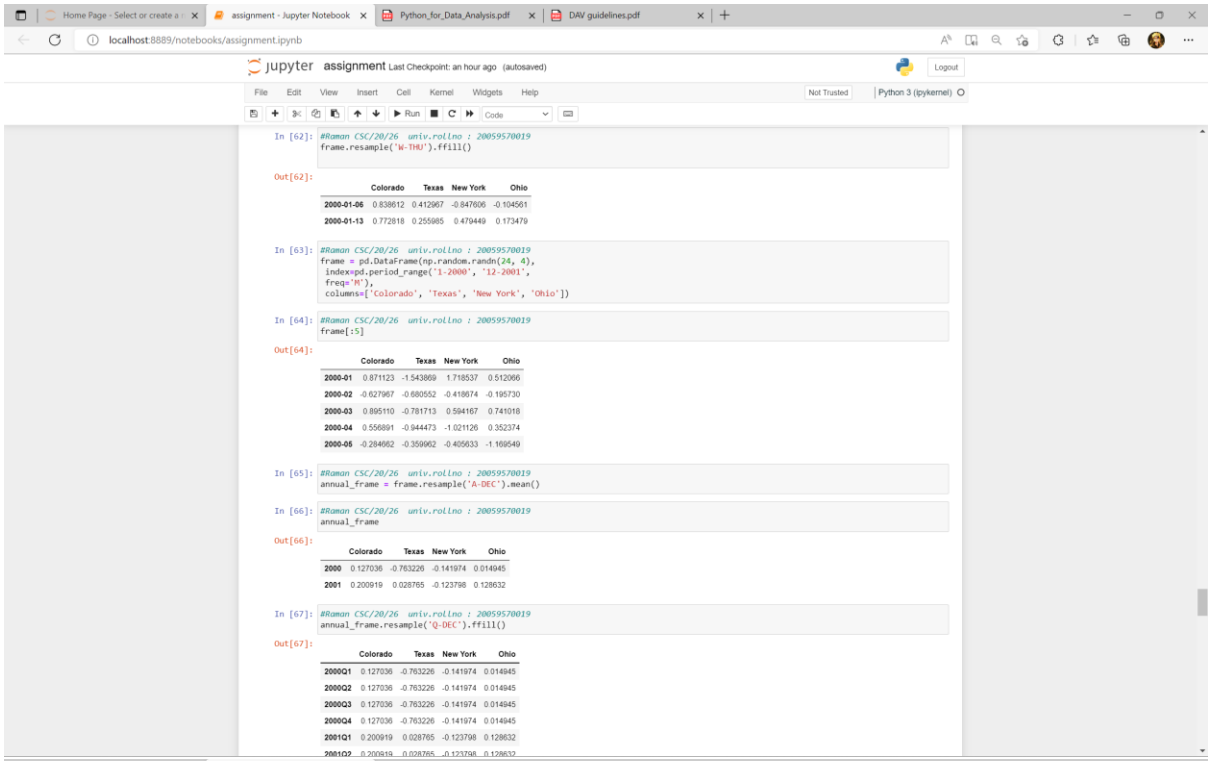
	Colorado	Texas	New York	Ohio
2000-01-05	0.838612	0.412967	-0.847606	-0.104561
2000-01-06	0.838612	0.412967	-0.847606	-0.104561
2000-01-07	0.838612	0.412967	-0.847606	-0.104561
2000-01-08	0.838612	0.412967	-0.847606	-0.104561
2000-01-09	0.838612	0.412967	-0.847606	-0.104561
2000-01-10	0.838612	0.412967	-0.847606	-0.104561
2000-01-11	0.838612	0.412967	-0.847606	-0.104561
2000-01-12	0.772818	0.255985	0.479449	0.173479

In [61]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame.resample('D').ffill(limit=2)
```

Out[61]:

	Colorado	Texas	New York	Ohio
2000-01-05	0.838612	0.412967	-0.847606	-0.104561
2000-01-06	0.838612	0.412967	-0.847606	-0.104561
2000-01-07	0.838612	0.412967	-0.847606	-0.104561
2000-01-08	NaN	NaN	NaN	NaN
2000-01-09	NaN	NaN	NaN	NaN
2000-01-10	NaN	NaN	NaN	NaN
2000-01-11	NaN	NaN	NaN	NaN
2000-01-12	0.772818	0.255985	0.479449	0.173479

In [62]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
```



In [62]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame.resample('W-THU').ffill()
```

Out[62]:

	Colorado	Texas	New York	Ohio
2000-01-06	0.838612	0.412967	-0.847606	-0.104561
2000-01-13	0.772818	0.255985	0.479449	0.173479

In [63]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame = pd.DataFrame(np.random.randn(24, 4),
 index=pd.period_range('1-2000', '12-2001',
 freq='M'),
 columns=['Colorado', 'Texas', 'New York', 'Ohio'])
```

In [64]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
frame[:5]
```

Out[64]:

	Colorado	Texas	New York	Ohio
2000-01	0.871123	-1.543869	1.718537	0.512066
2000-02	-0.627967	-0.680552	-0.418674	-0.195730
2000-03	0.895110	-0.781713	0.594167	0.741018
2000-04	0.556891	-0.944473	-1.021126	0.352374
2000-05	-0.284662	-0.359962	-0.405633	-1.169549

In [65]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame = frame.resample('A-DEC').mean()
```

In [66]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame
```

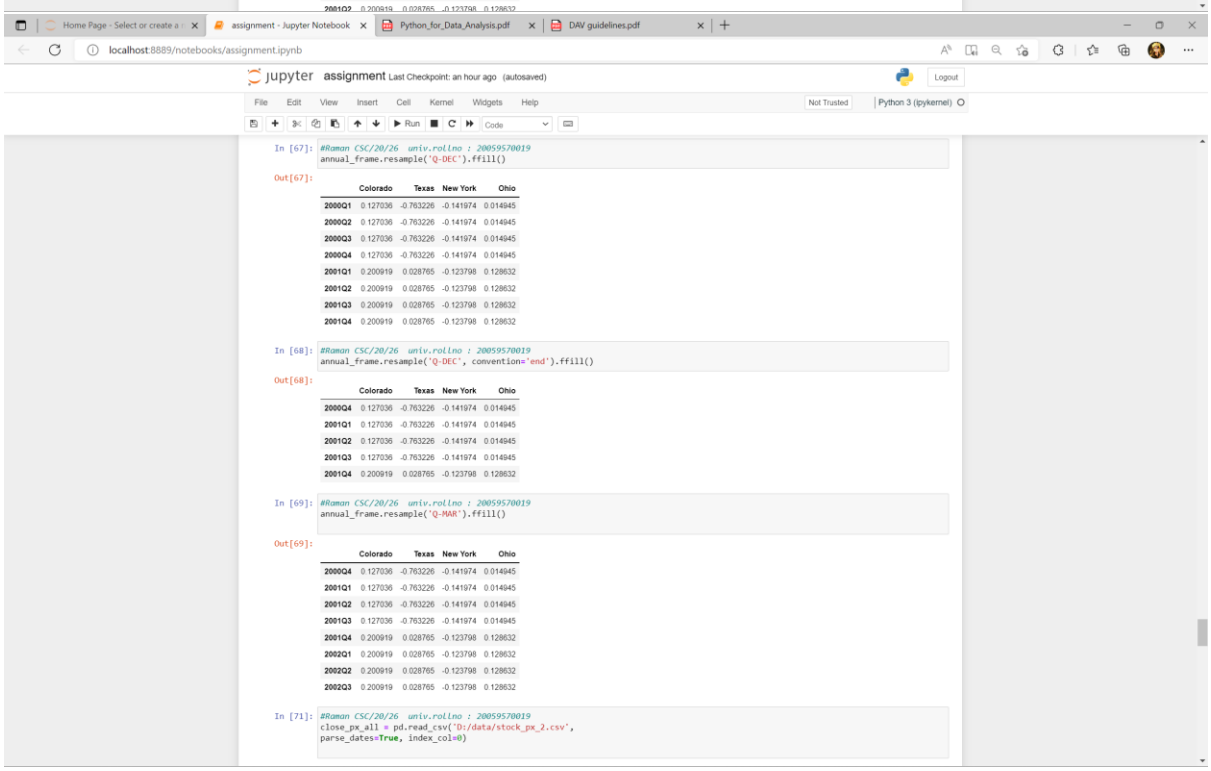
Out[66]:

	Colorado	Texas	New York	Ohio
2000	0.127036	-0.763226	-0.141974	0.014945
2001	0.200919	0.028765	-0.123798	0.128632

In [67]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame.resample('Q-DEC').ffill()
```

Out[67]:

	Colorado	Texas	New York	Ohio
2000Q1	0.127036	-0.763226	-0.141974	0.014945
2000Q2	0.127036	-0.763226	-0.141974	0.014945
2000Q3	0.127036	-0.763226	-0.141974	0.014945
2000Q4	0.127036	-0.763226	-0.141974	0.014945
2001Q1	0.200919	0.028765	-0.123798	0.128632
2001Q2	0.200919	0.028765	-0.123798	0.128632



In [67]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame.resample('Q-DEC').ffill()
```

Out[67]:

	Colorado	Texas	New York	Ohio
2000Q1	0.127036	-0.763226	-0.141974	0.014945
2000Q2	0.127036	-0.763226	-0.141974	0.014945
2000Q3	0.127036	-0.763226	-0.141974	0.014945
2000Q4	0.127036	-0.763226	-0.141974	0.014945
2001Q1	0.200919	0.028765	-0.123798	0.128632
2001Q2	0.200919	0.028765	-0.123798	0.128632
2001Q3	0.200919	0.028765	-0.123798	0.128632
2001Q4	0.200919	0.028765	-0.123798	0.128632

In [68]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame.resample('Q-DEC', convention='end').ffill()
```

Out[68]:

	Colorado	Texas	New York	Ohio
2000Q4	0.127036	-0.763226	-0.141974	0.014945
2001Q1	0.127036	-0.763226	-0.141974	0.014945
2001Q2	0.127036	-0.763226	-0.141974	0.014945
2001Q3	0.127036	-0.763226	-0.141974	0.014945
2001Q4	0.200919	0.028765	-0.123798	0.128632

In [69]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
annual_frame.resample('Q-MAR').ffill()
```

Out[69]:

	Colorado	Texas	New York	Ohio
2000Q4	0.127036	-0.763226	-0.141974	0.014945
2001Q1	0.127036	-0.763226	-0.141974	0.014945
2001Q2	0.127036	-0.763226	-0.141974	0.014945
2001Q3	0.127036	-0.763226	-0.141974	0.014945
2001Q4	0.200919	0.028765	-0.123798	0.128632
2002Q1	0.200919	0.028765	-0.123798	0.128632
2002Q2	0.200919	0.028765	-0.123798	0.128632
2002Q3	0.200919	0.028765	-0.123798	0.128632

In [71]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px_all = pd.read_csv('D:/data/stock_px_2.csv',
parse_dates=True, index_col=0)
```

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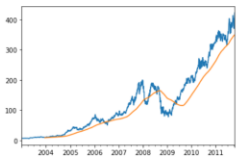
Run Code

In [72]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px = close_px_all[['AAPL', 'MSFT', 'XOM']]
```

In [73]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px = close_px.resample('B').ffill()
```

In [76]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px.AAPL.plot()
close_px.AAPL.rolling(250).mean().plot()
```

Out[76]: <AxesSubplot:>



In [77]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
appl_std250 = close_px.AAPL.rolling(250, min_periods=10).std()
```

In [78]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
appl_std250[5:12]
```

Out[78]:
```
2003-01-09         NaN
2003-01-10         NaN
2003-01-13         NaN
2003-01-14         NaN
2003-01-15    0.077496
2003-01-16    0.074760
2003-01-17    0.112368
Freq: B, Name: AAPL, dtype: float64
```

In [79]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
appl_std250.plot()
```

Out[79]: <AxesSubplot:>

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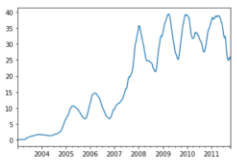
Run Code

In [79]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
appl_std250.plot()
```

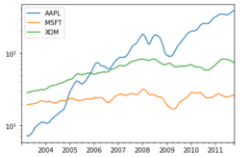
Out[79]: <AxesSubplot:>



In [80]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
expanding_mean = appl_std250.expanding().mean()
```

In [81]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px.rolling(60).mean().plot(logy=True)
```

Out[81]: <AxesSubplot:>



In [82]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px.rolling('20D').mean()
```

Out[82]:

	AAPL	MSFT	XOM
2003-01-02	7.400000	21.110000	29.220000
2003-01-03	7.425000	21.125000	29.230000
2003-01-06	7.433333	21.256667	29.473333
2003-01-07	7.432500	21.425000	29.342500

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Run Code

In [82]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
close_px.rolling('20D').mean()
```

Out[82]:

	AAPL	MSFT	XOM
2003-01-02	7.400000	21.110000	29.220000
2003-01-03	7.425000	21.125000	29.230000
2003-01-06	7.433333	21.256667	29.473333
2003-01-07	7.432500	21.425000	29.342500
2003-01-08	7.402000	21.402000	29.240000
...			
2011-10-10	389.351429	25.602143	72.527857
2011-10-11	388.505000	25.674286	72.835000
2011-10-12	388.531429	25.810000	73.400714
2011-10-13	388.826429	25.961429	73.905000
2011-10-14	391.038000	26.048667	74.185333

2292 rows × 3 columns

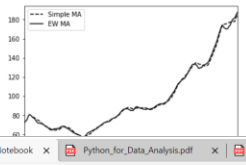
In [83]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
aapl_px = close_px.AAPL['2006':'2007']
```

In [84]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ma60 = aapl_px.rolling(30, min_periods=20).mean()
```

In [85]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
ewma60 = aapl_px.ewm(span=30).mean()
```

In [87]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
import matplotlib.pyplot as plt
ma60.plot(style='k--', label='Simple MA')
ewma60.plot(style='k-', label='EW MA')
plt.legend()
```

Out[87]:
```
<matplotlib.legend.Legend at 0x16108f9ce50>
```



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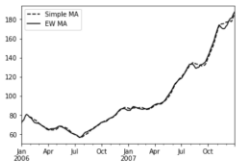
Run Code

In [87]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
import matplotlib.pyplot as plt
ma60.plot(style='k--', label='Simple MA')
ewma60.plot(style='k-', label='EW MA')
plt.legend()
```

Out[87]:
```
<matplotlib.legend.Legend at 0x16108f9ce50>
```



In [88]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
spx_px = close_px_all['SPX']
spx_rets = spx_px.pct_change()
returns = close_px.pct_change()
```

In [89]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
corr = returns.AAPL.rolling(125, min_periods=100).corr(spx_rets)
corr.plot()
```

Out[89]:
```
<AxesSubplot:>
```

In [90]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
corr = returns.rolling(125, min_periods=100).corr(spx_rets)
corr.plot()
```

Out[90]:
```
<AxesSubplot:>
```

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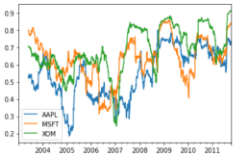
Run | Code

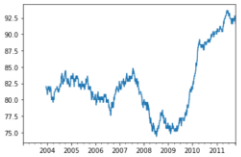
In [90]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
corr = returns.rolling(125, min_periods=100).corr(spx_rets)
corr.plot()
```

Out[90]: <AxesSubplot:>



In [91]:
```
#Raman CSC/20/26  univ.rollno : 20059570019
from scipy.stats import percentileofscore
score_at_2percent = lambda x: percentileofscore(x, 0.02)
result = returns.AAPL.rolling(250).apply(score_at_2percent)
result.plot()
```

Out[91]: <AxesSubplot:>



In [ ]: