In [ ]:
```
from google.colab import drive
drive.mount("/content/gdrive")
```
```
Mounted at /content/gdrive
```

In [ ]:
```
from matplotlib import pyplot as plt
import pandas as pd
import numpy as np
from scipy import stats
```

SP 500 (large cap) & its Santa return (1962 - 2022)

In [ ]:
```
#Monthly data with variables
sp500daily=pd.read_excel('/content/gdrive/MyDrive/SP 500 daily return.xlsx', sheet_name= "Daily")  #SP 500 daily price level and return (1962-2023)
santadaily=pd.read_excel('/content/gdrive/MyDrive/SP 500 daily return.xlsx', sheet_name= "SantaDaily")
#SP 500 santa day price level and return (1962-2023)
```

In [ ]:
```
#original data set
sp500daily = sp500daily.dropna()  #drop NA
sp500daily
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
1	1962-07-03	56.49	0.011278
2	1962-07-05	56.81	0.005665
3	1962-07-06	56.17	-0.011266
4	1962-07-09	56.55	0.006765
5	1962-07-10	57.20	0.011494
...	...	...	...
15238	2023-01-13	3999.09	0.003997
15239	2023-01-17	3990.97	-0.002030
15240	2023-01-18	3928.86	-0.015563
15241	2023-01-19	3898.85	-0.007638
15242	2023-01-20	3972.61	0.018918

15242 rows × 3 columns

In [ ]:
```
#summary stats
sp500daily.describe()
#From 1962-2023, daily sp 500 return was about 0.0334%
```

Out[ ]:

	Level of the S&P 500 Index	Return on the S&P 500 Index
count	15242.000000	15242.000000
mean	882.504172	0.000334
std	1009.499507	0.010399
min	53.490000	-0.204669
25%	104.222500	-0.004305
50%	419.925000	0.000462
75%	1298.075000	0.005203
max	4796.560000	0.115800

In [ ]:
```
#original data set
santadaily = santadaily.dropna() #drop NA
santadaily
#Day column measures which day it is in the santa week (1-7)
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
0	1962-12-24	62.63	-0.000160	1
1	1962-12-26	63.02	0.006227	2
2	1962-12-27	62.93	-0.001428	3
3	1962-12-28	62.96	0.000477	4
4	1962-12-31	63.10	0.002224	5
...	...	...	...	...
422	2022-12-28	3783.22	-0.012021	3
423	2022-12-29	3849.28	0.017461	4
424	2022-12-30	3839.50	-0.002541	5
425	2023-01-03	3824.14	-0.004001	6
426	2023-01-04	3852.97	0.007539	7

427 rows × 4 columns

In [ ]:
```
#summary stats
santadaily.describe()
#From 1962-2023, daily santa day return was about 0.1227%
```

Out[ ]:

	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
count	427.000000	427.000000	427.000000
mean	911.397658	0.001705	4.000000
std	1058.519666	0.009373	2.002346
min	62.630000	-0.038345	1.000000
25%	105.730000	-0.003041	2.000000
50%	437.980000	0.000927	4.000000
75%	1275.265000	0.005731	6.000000
max	4796.560000	0.050099	7.000000

In [ ]:
```
sp500daily.skew()
```
```
<ipython-input-8-91f77ab80b4f>:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  sp500daily.skew()
```
Out[ ]:
```
Level of the S&P 500 Index     1.625283
Return on the S&P 500 Index   -0.615386
dtype: float64
```

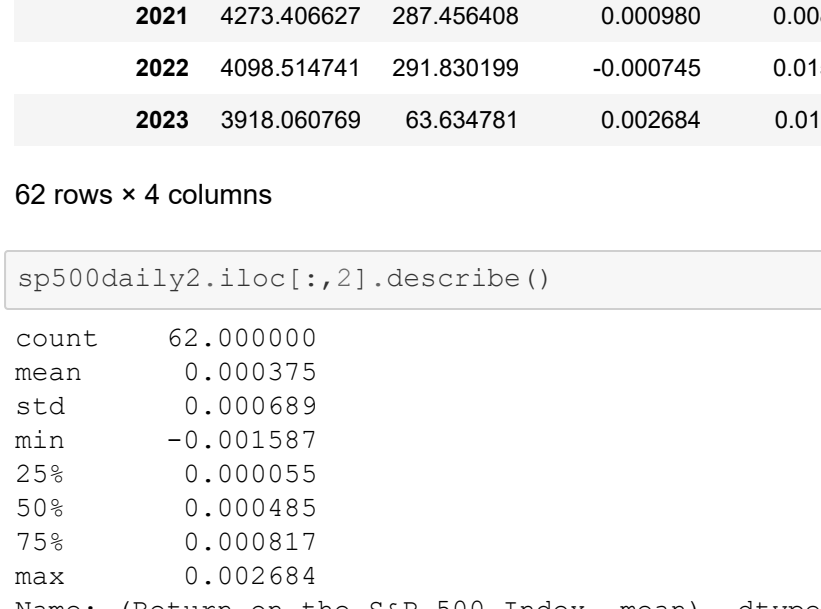
In [ ]:
```
santadaily.skew()
```
```
<ipython-input-9-c54944d3dc89>:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  santadaily.skew()
```
Out[ ]:
```
Level of the S&P 500 Index     1.674985
Return on the S&P 500 Index    0.685791
Day                            0.000000
dtype: float64
```

In [ ]:
```
sp500daily.kurt()
```
```
<ipython-input-10-d0de1da2160e>:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  sp500daily.kurt()
```
Out[ ]:
```
Level of the S&P 500 Index      2.396392
Return on the S&P 500 Index    19.893104
dtype: float64
```

In [ ]:
```
santadaily.kurt()
```
```
<ipython-input-11-5551759c5b93>:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  santadaily.kurt()
```
Out[ ]:
```
Level of the S&P 500 Index     2.620478
Return on the S&P 500 Index    4.723219
Day                           -1.250577
dtype: float64
```

In [ ]:
```
#summary stats for each day (1-7)
print("The Stats summary of the first day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 1, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the second day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 2, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the third day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 3, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fourth day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 4, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fifth day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 5, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the sixth day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 6, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the seventh day of the Santa Claus Rally is")
print(santadaily.loc[santadaily['Day'] == 7, 'Return on the S&P 500 Index'].describe())
```
```
The Stats summary of the first day of the Santa Claus Rally is
count    61.000000
mean      0.002066
std       0.007577
min      -0.027112
25%      -0.001807
50%       0.001252
75%       0.005868
max       0.024403
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the second day of the Santa Claus Rally is
count    61.000000
mean      0.003156
std       0.009244
min      -0.025593
25%      -0.000951
50%       0.002248
75%       0.006227
max       0.049594
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the third day of the Santa Claus Rally is
count    61.000000
mean      0.000295
std       0.007396
min      -0.016029
25%      -0.003991
50%       0.000374
75%       0.003979
max       0.020890
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fourth day of the Santa Claus Rally is
count    61.000000
mean      0.001459
std       0.006820
min      -0.011050
25%      -0.002977
50%       0.000477
75%       0.003988
max       0.024407
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fifth day of the Santa Claus Rally is
count    61.000000
mean      0.000451
std       0.006717
min      -0.017391
25%      -0.004291
50%       0.000578
75%       0.004563
max       0.020846
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the sixth day of the Santa Claus Rally is
count    61.000000
mean      0.001543
std       0.012903
min      -0.028032
25%      -0.006498
50%      -0.000340
75%       0.008303
max       0.035859
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the seventh day of the Santa Claus Rally is
count    61.000000
mean      0.002963
std       0.012667
min      -0.038345
25%      -0.002086
50%       0.003115
75%       0.007539
max       0.050099
Name: Return on the S&P 500 Index, dtype: float64
```

In [ ]:
```
#santa day return plot (1-7)
day = [santadaily.loc[santadaily['Day'] == 1, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 2, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 3, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 4, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 5, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 6, 'Return on the S&P 500 Index'].mean(),
       santadaily.loc[santadaily['Day'] == 7, 'Return on the S&P 500 Index'].mean()]

dfday = pd.DataFrame(day)
dfday

# plot
ax = dfday.plot(kind='bar', figsize=(6, 4), title='Santa Day Return', ylabel='Return')
```



In [ ]:
```
#Transform date to year only
sp500daily['Calendar Date'] = pd.DatetimeIndex(sp500daily['Calendar Date']).year
sp500daily1 = sp500daily

sp500daily2 = sp500daily1.groupby('Calendar Date').agg(['mean','std'])
sp500daily2
```

Out[ ]:

	Level of the S&P 500 Index		Return on the S&P 500 Index	
	mean	std	mean	std
Calendar Date				
1962	58.672160	2.333311	0.001010	0.008293
1963	69.860558	3.029395	0.000704	0.005399
1964	81.371542	2.826957	0.000488	0.003294
1965	88.153294	2.600847	0.000353	0.004261
1966	85.181984	5.575158	-0.000529	0.007432
...	...	...	...	...
2019	2913.357937	150.667995	0.001038	0.007855
2020	3217.856482	319.225747	0.000832	0.021690
2021	4273.406627	287.456408	0.000980	0.008251
2022	4098.514741	291.830199	-0.000745	0.015228
2023	3918.060769	63.634781	0.002684	0.011333

62 rows × 4 columns

In [ ]:
```
sp500daily2.iloc[:,2].describe()
```
Out[ ]:
```
count    62.000000
mean      0.000375
std       0.000689
min      -0.001587
25%       0.000055
50%       0.000485
75%       0.000817
max       0.002684
Name: (Return on the S&P 500 Index, mean), dtype: float64
```

In [ ]:

In [ ]:
```
#Transform date to year only
santadaily['Calendar Date'] = pd.DatetimeIndex(santadaily['Calendar Date']).year
santadaily
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
0	1962	62.63	-0.000160	1
1	1962	63.02	0.006227	2
2	1962	62.93	-0.001428	3
3	1962	62.96	0.000477	4
4	1962	63.10	0.002224	5
...	...	...	...	...
422	2022	3783.22	-0.012021	3
423	2022	3849.28	0.017461	4
424	2022	3839.50	-0.002541	5
425	2023	3824.14	-0.004001	6
426	2023	3852.97	0.007539	7

427 rows × 4 columns

In [ ]:
```
santadaily1=santadaily
santadaily1.head(8)
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
0	1962	62.63	-0.000160	1
1	1962	63.02	0.006227	2
2	1962	62.93	-0.001428	3
3	1962	62.96	0.000477	4
4	1962	63.10	0.002224	5
5	1963	62.69	-0.006498	6
6	1963	63.72	0.016430	7
7	1963	73.97	0.002168	1

In [ ]:
```
#day 6 and 7 belong to previous year's santa week
for i in range(6,427):
    if santadaily1.iloc[i,3] > 5:
        santadaily1.iloc[i,0] = santadaily1.iloc[i,0]-1

santadaily1
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
0	1962	62.63	-0.000160	1
1	1962	63.02	0.006227	2
2	1962	62.93	-0.001428	3
3	1962	62.96	0.000477	4
4	1962	63.10	0.002224	5
...	...	...	...	...
422	2022	3783.22	-0.012021	3
423	2022	3849.28	0.017461	4
424	2022	3839.50	-0.002541	5
425	2022	3824.14	-0.004001	6
426	2022	3852.97	0.007539	7

427 rows × 4 columns

In [ ]:
```
#each year santa mean daily return and std (1962-2022)
santadaily2 = santadaily1.groupby('Calendar Date').agg(['mean','std'])
santadaily2
```

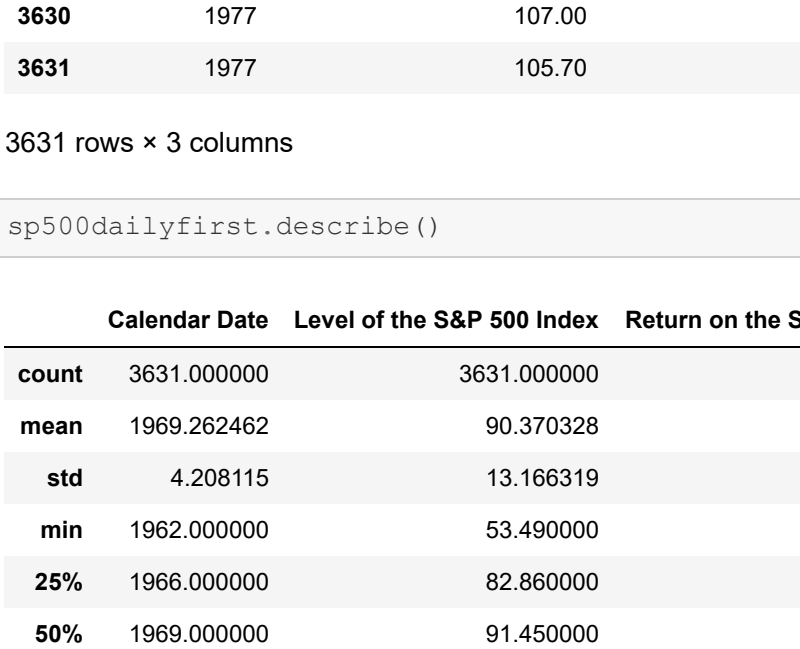
Out[ ]:

	Level of the S&P 500 Index		Return on the S&P 500 Index		Day	
	mean	std	mean	std	mean	std
Calendar Date						
1962	63.007143	0.357758	0.002467	0.007252	4.0	2.160247
1963	74.748571	0.580702	0.003241	0.002143	4.0	2.160247
1964	84.277143	0.323559	0.000822	0.004630	4.0	2.160247
1965	91.990000	0.367786	0.000115	0.003967	4.0	2.160247
1966	80.872857	0.419631	-0.002002	0.002876	4.0	2.160247
...	...	...	...	...	...	...
2018	2465.448571	84.846731	0.002115	0.025576	4.0	2.160247
2019	3235.440000	12.321358	0.000493	0.005579	4.0	2.160247
2020	3725.868571	16.143591	0.001449	0.008062	4.0	2.160247
2021	4786.515714	10.716739	0.002051	0.006062	4.0	2.160247
2022	3831.882857	23.831618	0.001180	0.009745	4.0	2.160247

61 rows × 6 columns

In [ ]:
```
#weekly santa average return needs to time 7, which is 0.12278 * 7 = 0.85894
santadaily2.iloc[:,2].describe()
```
Out[ ]:
```
count    61.000000
mean      0.001705
std       0.003397
min      -0.005775
25%       0.000115
50%       0.001593
75%       0.003068
max       0.010396
Name: (Return on the S&P 500 Index, mean), dtype: float64
```

In [ ]:
```
#plot each year santa mean daily return and std (1962-2022)
from matplotlib import pyplot as plt

x = range(1962,2023)
y = santadaily2.iloc[:,2]

fig, ax = plt.subplots()
ax.plot(x, y, 'o-', label='Santa Daily Return')
#y_avg = 0.008989
#ax.plot(x, y_avg, color='red', lw=6, ls='--', label="average plot")

plt.legend(loc=0)
plt.show()
```



SP 500 first period (1962 to 1977)

In [ ]:
```
#first period
sp500dailyfirst = sp500daily.iloc[0:3631,:]
sp500dailyfirst
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
1	1962	56.49	0.011278
2	1962	56.81	0.005665
3	1962	56.17	-0.011266
4	1962	56.55	0.006765
5	1962	57.20	0.011494
...	...	...	...
3627	1976	106.34	-0.004027
3628	1976	106.88	0.005078
3629	1976	107.46	0.005427
3630	1977	107.00	-0.004281
3631	1977	105.70	-0.012150

3631 rows × 3 columns

In [ ]:
```
sp500dailyfirst.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
count	3631.000000	3631.000000	3631.000000
mean	1969.262462	90.370328	0.000205
std	4.208115	13.166319	0.007633
min	1962.000000	53.490000	-0.036713
25%	1966.000000	82.860000	-0.003710
50%	1969.000000	91.450000	0.000327
75%	1973.000000	100.390000	0.004159
max	1977.000000	120.240000	0.050224

In [ ]:
```
santadailyfirst = santadaily.iloc[0:112,:]
santadailyfirst
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
0	1962	62.63	-0.000160	1
1	1962	63.02	0.006227	2
2	1962	62.93	-0.001428	3
3	1962	62.96	0.000477	4
4	1962	63.10	0.002224	5
...	...	...	...	...
107	1977	94.75	0.000634	3
108	1977	94.94	0.002005	4
109	1977	95.10	0.001685	5
110	1977	93.82	-0.013460	6
111	1977	93.52	-0.003198	7

112 rows × 4 columns

In [ ]:
```
santadailyfirst.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
count	112.000000	112.000000	112.000000	112.000000
mean	1969.500000	90.903393	0.002739	4.000000
std	4.63049	13.823004	0.007310	2.008989
min	1962.000000	62.630000	-0.013460	1.000000
25%	1965.75000	83.225000	-0.001684	2.000000
50%	1969.50000	92.190000	0.002034	4.000000
75%	1973.25000	100.087500	0.006079	6.000000
max	1977.00000	119.570000	0.030571	7.000000

In [ ]:
```
sp500dailyfirst.skew()
```
Out[ ]:
```
Calendar Date                 -0.019613
Level of the S&P 500 Index    -0.414631
Return on the S&P 500 Index    0.268019
dtype: float64
```

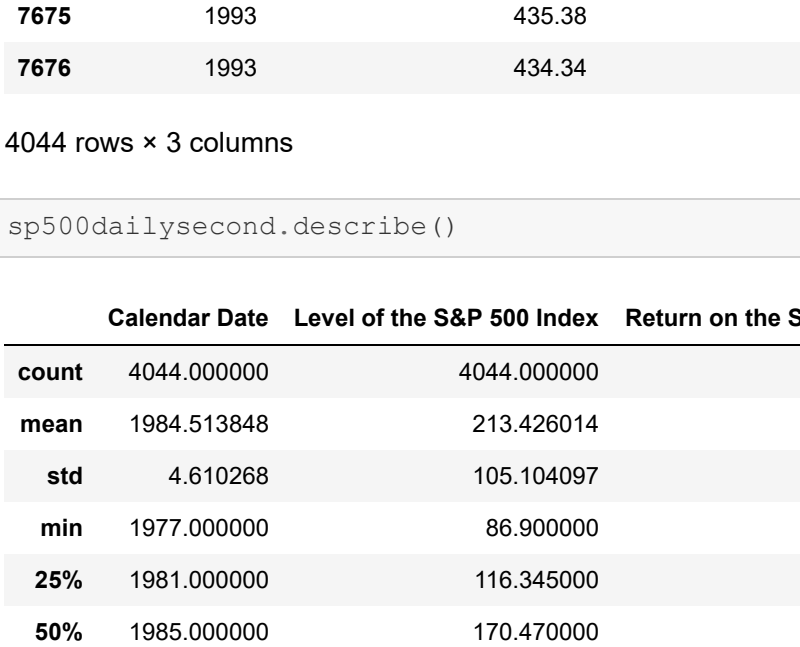
In [ ]:
```
sp500dailyfirst.kurt()
```
Out[ ]:
```
Calendar Date                 -1.205174
Level of the S&P 500 Index    -0.194406
Return on the S&P 500 Index    3.265125
dtype: float64
```

In [ ]:
```
santadailyfirst.skew()
```
Out[ ]:
```
Calendar Date                  0.000000
Level of the S&P 500 Index    -0.300859
Return on the S&P 500 Index    0.950265
Day                            0.000000
dtype: float64
```

In [ ]:
```
santadailyfirst.kurt()
```
Out[ ]:
```
Calendar Date                 -1.209646
Level of the S&P 500 Index    -0.238507
Return on the S&P 500 Index    2.137789
Day                           -1.252106
dtype: float64
```

In [ ]:
```
print("The Stats summary of the first day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 1, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the second day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 2, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the third day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 3, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fourth day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 4, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fifth day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 5, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the sixth day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 6, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the seventh day of the Santa Claus Rally is")
print(santadailyfirst.loc[santadailyfirst['Day'] == 7, 'Return on the S&P 500 Index'].describe())
```
```
The Stats summary of the first day of the Santa Claus Rally is
count    16.000000
mean      0.002252
std       0.006948
min      -0.007268
25%      -0.002089
50%       0.001042
75%       0.008542
max       0.013948
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the second day of the Santa Claus Rally is
count    16.000000
mean      0.005609
std       0.007945
min      -0.005769
25%       0.000500
50%       0.005762
75%       0.007933
max       0.030571
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the third day of the Santa Claus Rally is
count    16.000000
mean      0.001281
std       0.007054
min      -0.006965
25%      -0.003931
50%      -0.000348
75%       0.003309
max       0.020890
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fourth day of the Santa Claus Rally is
count    16.000000
mean      0.000530
std       0.004132
min      -0.008975
25%      -0.002279
50%       0.001044
75%       0.003939
max       0.005847
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fifth day of the Santa Claus Rally is
count    16.000000
mean      0.004465
std       0.005245
min      -0.001301
25%       0.001408
50%       0.003862
75%       0.005582
max       0.020846
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the sixth day of the Santa Claus Rally is
count    16.000000
mean      0.000478
std       0.009319
min      -0.013460
25%      -0.004744
50%      -0.001041
75%       0.006067
max       0.024358
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the seventh day of the Santa Claus Rally is
count    16.000000
mean      0.004557
std       0.008613
min      -0.012150
25%       0.000795
50%       0.004039
75%       0.006909
max       0.021704
Name: Return on the S&P 500 Index, dtype: float64
```

In [ ]:
```
day = [santadailyfirst.loc[santadailyfirst['Day'] == 1, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 2, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 3, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 4, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 5, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 6, 'Return on the S&P 500 Index'].mean(),
       santadailyfirst.loc[santadailyfirst['Day'] == 7, 'Return on the S&P 500 Index'].mean()]

dfday = pd.DataFrame(day)
dfday

# plot
ax = dfday.plot(kind='bar', figsize=(6, 4), title='1962 to 1977 Santa Day Return', ylabel='Return')
```



SP 500 Second period (1978 to 1993)

In [ ]:
```
sp500dailysecond = sp500daily.iloc[3632:7676,:]
sp500dailysecond
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
3633	1977	105.02	0.002482
3634	1977	105.01	-0.000095
3635	1977	105.20	0.001809
3636	1977	104.12	-0.010266
3637	1977	103.40	-0.006915
...	...	...	...
7672	1992	437.98	-0.002664
7673	1992	438.82	0.001918
7674	1992	435.71	-0.007087
7675	1993	435.38	-0.000757
7676	1993	434.34	-0.002389

4044 rows × 3 columns

In [ ]:
```
sp500dailysecond.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
count	4044.000000	4044.000000	4044.000000
mean	1984.513848	213.426014	0.000400
std	4.610268	105.104097	0.009766
min	1977.000000	86.900000	-0.204669
25%	1981.000000	116.345000	-0.004595
50%	1985.000000	170.470000	0.000421
75%	1989.000000	304.772500	0.005255
max	1993.000000	441.280000	0.090994

In [ ]:
```
sp500dailysecond.skew()
```
Out[ ]:
```
Calendar Date                 -0.000123
Level of the S&P 500 Index     0.531413
Return on the S&P 500 Index   -2.324720
dtype: float64
```

In [ ]:
```
sp500dailysecond.kurt()
```
Out[ ]:
```
Calendar Date                 -1.208271
Level of the S&P 500 Index    -1.092435
Return on the S&P 500 Index   53.110563
dtype: float64
```

In [ ]:
```
santadailysecond = santadaily.iloc[112:224,:]
santadailysecond
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
112	1978	96.31	0.016894	1
113	1978	97.52	0.012564	2
114	1978	96.66	-0.008819	3
115	1978	96.28	-0.003931	4
116	1978	96.11	-0.001766	5
...	...	...	...	...
219	1993	470.58	-0.000764	3
220	1993	468.64	-0.004123	4
221	1993	466.45	-0.004673	5
222	1993	465.44	-0.002165	6
223	1993	466.89	0.003115	7

112 rows × 4 columns

In [ ]:
```
santadailysecond.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
count	112.00000	112.000000	112.000000	112.000000
mean	1985.50000	244.664643	0.001436	4.000000
std	4.63049	119.638573	0.009280	2.008989
min	1978.00000	96.110000	-0.025593	1.000000
25%	1981.75000	138.247500	-0.004173	2.000000
50%	1985.50000	226.725000	0.001430	4.000000
75%	1989.25000	334.840000	0.005441	6.000000
max	1993.00000	470.940000	0.035859	7.000000

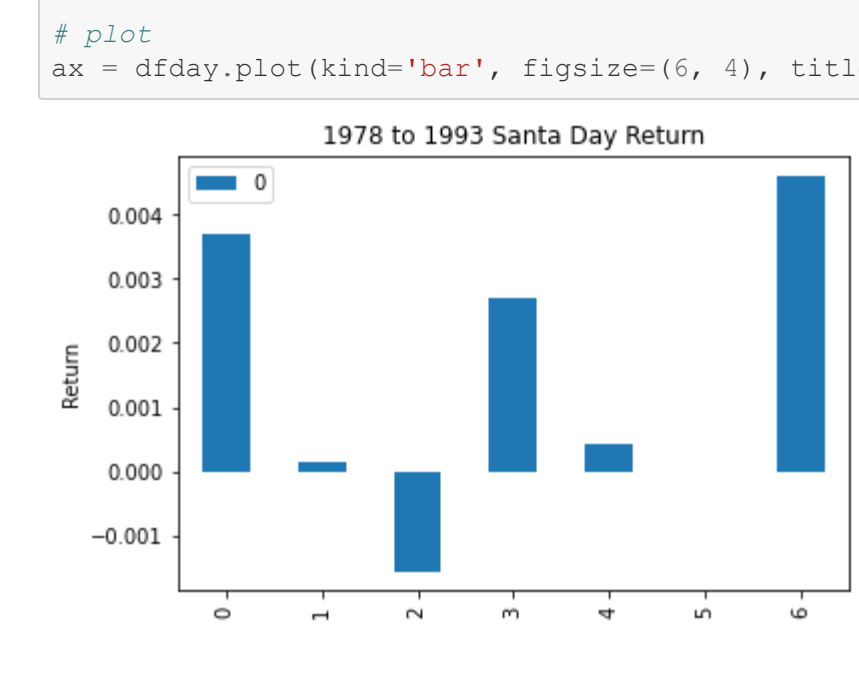
In [ ]:
```
santadailysecond.skew()
```
Out[ ]:
```
Calendar Date                  0.000000
Level of the S&P 500 Index     0.516487
Return on the S&P 500 Index    0.352370
Day                            0.000000
dtype: float64
```

In [ ]:
```
santadailysecond.kurt()
```
Out[ ]:
```
Calendar Date                 -1.209646
Level of the S&P 500 Index    -1.050887
Return on the S&P 500 Index    1.802932
Day                           -1.252106
dtype: float64
```

In [ ]:
```
print("The Stats summary of the first day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 1, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the second day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 2, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the third day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 3, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fourth day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 4, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fifth day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 5, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the sixth day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 6, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the seventh day of the Santa Claus Rally is")
print(santadailysecond.loc[santadailysecond['Day'] == 7, 'Return on the S&P 500 Index'].describe())
```

```
The Stats summary of the first day of the Santa Claus Rally is
count    16.000000
mean      0.003708
std       0.006910
min      -0.006856
25%       0.000411
50%       0.002746
75%       0.006959
max       0.017607
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the second day of the Santa Claus Rally is
count    16.000000
mean      0.000157
std       0.009164
min      -0.025593
25%      -0.001868
50%       0.000770
75%       0.003429
max       0.013798
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the third day of the Santa Claus Rally is
count    16.000000
mean     -0.001560
std       0.006004
min      -0.011276
25%      -0.005615
50%      -0.001714
75%       0.003384
max       0.009439
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fourth day of the Santa Claus Rally is
count    16.000000
mean      0.002713
std       0.007303
min      -0.006443
25%      -0.003160
50%       0.002070
75%       0.005217
max       0.021355
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fifth day of the Santa Claus Rally is
count    16.000000
mean      0.000435
std       0.004539
min      -0.007087
25%      -0.003528
50%       0.001486
75%       0.003524
max       0.007785
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the sixth day of the Santa Claus Rally is
count    16.000000
mean     -0.000008
std       0.014334
min      -0.020196
25%      -0.009304
50%      -0.001461
75%       0.004817
max       0.035859
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the seventh day of the Santa Claus Rally is
count    16.000000
mean      0.004610
std       0.012550
min      -0.021916
25%      -0.003149
50%       0.005570
75%       0.012708
max       0.023291
Name: Return on the S&P 500 Index, dtype: float64
```

In [ ]:
```
day = [santadailysecond.loc[santadailysecond['Day'] == 1, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 2, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 3, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 4, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 5, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 6, 'Return on the S&P 500 Index'].mean(),
       santadailysecond.loc[santadailysecond['Day'] == 7, 'Return on the S&P 500 Index'].mean()]

dfday = pd.DataFrame(day)
dfday

# plot
ax = dfday.plot(kind='bar', figsize=(6, 4), title='1978 to 1993 Santa Day Return', ylabel='Return')
```



SP 500 third period (1994 to 2008)

In [ ]:
```
sp500dailythird = sp500daily.iloc[7676:11707,:]
sp500dailythird
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
7677	1993	434.52	0.000414
7678	1993	430.73	-0.008722
7679	1993	429.05	-0.003900
7680	1993	430.95	0.004428
7681	1993	431.04	0.000209
...	...	...	...
11703	2008	869.42	-0.003873
11704	2008	890.64	0.024407
11705	2008	903.25	0.014158
11706	2009	931.80	0.031608
11707	2009	927.45	-0.004668

4031 rows × 3 columns

In [ ]:
```
sp500dailythird.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
count	4031.000000	4031.000000	4031.000000
mean	2000.501364	1020.626078	0.000258
std	4.614244	333.251400	0.011830
min	1993.000000	429.050000	-0.090350
25%	1996.000000	750.675000	-0.004931
50%	2000.000000	1107.830000	0.000489
75%	2005.000000	1285.945000	0.005717
max	2009.000000	1565.150000	0.115800

In [ ]:
```
santadailythird = santadaily.iloc[224:329,:]
santadailythird
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
224	1994	459.83	0.000326	1
225	1994	462.47	0.005741	2
226	1994	460.86	-0.003481	3
227	1994	461.17	0.000673	4
228	1994	459.27	-0.004120	5
...	...	...	...	...
324	2008	869.42	-0.003873	3
325	2008	890.64	0.024407	4
326	2008	903.25	0.014158	5
327	2008	931.80	0.031608	6
328	2008	927.45	-0.004668	7

105 rows × 4 columns

In [ ]:
```
santadailythird.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
count	105.000000	105.000000	105.000000	105.000000
mean	2001.000000	1079.759714	0.001720	4.000000
std	4.341216	300.288373	0.011065	2.009592
min	1994.000000	459.110000	-0.038345	1.000000
25%	1997.000000	879.820000	-0.003149	2.000000
50%	2001.000000	1154.670000	0.000673	4.000000
75%	2005.000000	1305.970000	0.005503	6.000000
max	2008.000000	1497.660000	0.050099	7.000000

In [ ]:
```
sp500dailythird.skew()
```

Out[ ]:
```
Calendar Date                  0.002664
Level of the S&P 500 Index    -0.433531
Return on the S&P 500 Index   -0.019738
dtype: float64
```

In [ ]:
```
sp500dailythird.kurt()
```

Out[ ]:
```
Calendar Date                  -1.210263
Level of the S&P 500 Index     -1.050755
Return on the S&P 500 Index    10.267754
dtype: float64
```

In [ ]:
```
santadailythird.skew()
```

Out[ ]:
```
Calendar Date                  0.000000
Level of the S&P 500 Index    -0.532237
Return on the S&P 500 Index    0.665412
Day                            0.000000
dtype: float64
```

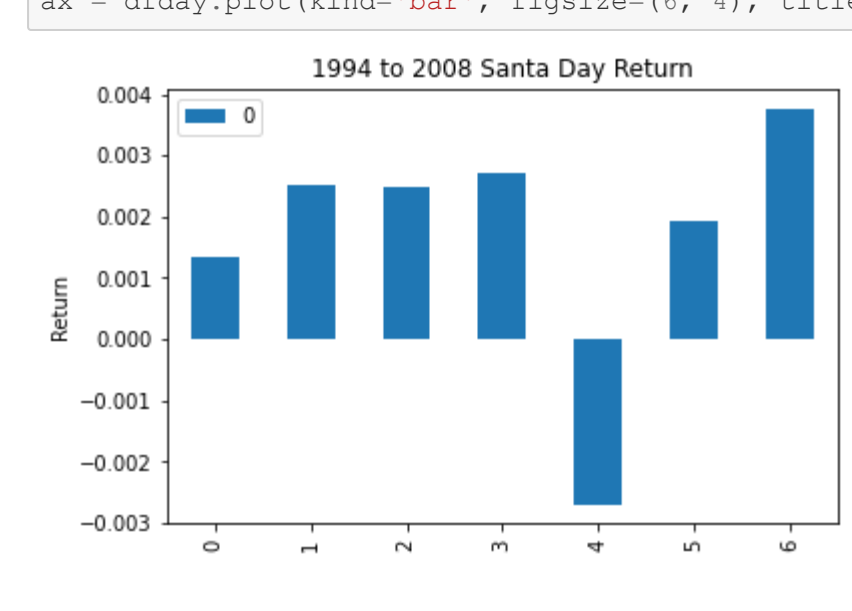
In [ ]:
```
santadaily.kurt()
```

Out[ ]:
```
Calendar Date                 -1.200639
Level of the S&P 500 Index     2.620478
Return on the S&P 500 Index    4.723219
Day                           -1.250577
dtype: float64
```

In [ ]:
```
print("The Stats summary of the first day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 1, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the second day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 2, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the third day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 3, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fourth day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 4, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fifth day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 5, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the sixth day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 6, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the seventh day of the Santa Claus Rally is")
print(santadailythird.loc[santadailythird['Day'] == 7, 'Return on the S&P 500 Index'].describe())
```

```
The Stats summary of the first day of the Santa Claus Rally is
count    15.000000
mean      0.001351
std       0.007718
min      -0.006836
25%      -0.003077
50%      -0.000210
75%       0.003947
max       0.024403
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the second day of the Santa Claus Rally is
count    15.000000
mean      0.002505
std       0.004483
min      -0.009553
25%       0.000596
50%       0.004031
75%       0.005549
max       0.007154
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the third day of the Santa Claus Rally is
count    15.000000
mean      0.002482
std       0.009538
min      -0.016029
25%      -0.001778
50%       0.001297
75%       0.008727
max       0.018047
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fourth day of the Santa Claus Rally is
count    15.000000
mean      0.002714
std       0.008291
min      -0.007956
25%      -0.001073
50%       0.000673
75%       0.003675
max       0.024407
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fifth day of the Santa Claus Rally is
count    15.000000
mean     -0.002693
std       0.007398
min      -0.017391
25%      -0.005869
50%      -0.002192
75%       0.001272
max       0.014158
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the sixth day of the Santa Claus Rally is
count    15.000000
mean      0.001919
std       0.016082
min      -0.028032
25%      -0.006577
50%      -0.000919
75%       0.006767
max       0.033200
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the seventh day of the Santa Claus Rally is
count    15.000000
mean      0.003764
std       0.018135
min      -0.038345
25%      -0.000242
50%       0.002082
75%       0.010788
max       0.050099
Name: Return on the S&P 500 Index, dtype: float64
```

In [ ]:
```
day = [santadailythird.loc[santadailythird['Day'] == 1, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 2, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 3, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 4, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 5, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 6, 'Return on the S&P 500 Index'].mean(),
       santadailythird.loc[santadailythird['Day'] == 7, 'Return on the S&P 500 Index'].mean()]

dfday = pd.DataFrame(day)
dfday

# plot
ax = dfday.plot(kind='bar', figsize=(6, 4), title='1994 to 2008 Santa Day Return', ylabel='Return')
```



SP 500 Fourth period (2009 to 2022)

In [ ]:
```
sp500dailyfourth = sp500daily.iloc[11709:,:]
sp500dailyfourth
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
11709	2009	908.65	-0.030010
11710	2009	909.73	0.003397
11711	2009	890.35	-0.021303
11712	2009	870.26	-0.022564
11713	2009	871.79	0.001758
...	...	...	...
15238	2023	3999.09	0.003997
15239	2023	3990.97	-0.002030
15240	2023	3928.86	-0.015563
15241	2023	3898.85	-0.007638
15242	2023	3972.61	0.018918

3534 rows × 3 columns

In [ ]:
```
sp500dailyfourth.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index
count	3534.000000	3534.000000	3534.000000
mean	2015.533390	2304.673444	0.000479
std	4.047397	1026.827917	0.011736
min	2009.000000	676.530000	-0.119841
25%	2012.000000	1388.530000	-0.003971
50%	2016.000000	2089.220000	0.000687
75%	2019.000000	2896.735000	0.005815
max	2023.000000	4796.560000	0.093828

In [ ]:
```
santadailyfourth = santadaily.iloc[328:,:]
santadailyfourth
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
328	2008	927.45	-0.004668	7
329	2009	1126.48	0.005256	1
330	2009	1127.78	0.001154	2
331	2009	1126.20	-0.001401	3
332	2009	1126.42	0.000195	4
...	...	...	...	...
422	2022	3783.22	-0.012021	3
423	2022	3849.28	0.017461	4
424	2022	3839.50	-0.002541	5
425	2022	3824.14	-0.004001	6
426	2022	3852.97	0.007539	7

99 rows × 4 columns

In [ ]:
```
santadailyfourth.describe()
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
count	99.000000	99.000000	99.000000	99.000000
mean	2015.424242	2415.513737	0.000757	4.030303
std	4.100998	1079.456180	0.009595	2.022600
min	2008.000000	927.450000	-0.027112	1.000000
25%	2012.000000	1423.010000	-0.002808	2.000000
50%	2015.000000	2090.570000	0.000034	4.000000
75%	2019.000000	3232.815000	0.005192	6.000000
max	2022.000000	4796.560000	0.049594	7.000000

In [ ]:
```
sp500dailyfourth.skew()
```

Out[ ]:
```
Calendar Date                  0.001683
Level of the S&P 500 Index     0.626614
Return on the S&P 500 Index   -0.380451
dtype: float64
```

In [ ]:
```
sp500dailyfourth.kurt()
```

Out[ ]:
```
Calendar Date                  -1.207409
Level of the S&P 500 Index     -0.546093
Return on the S&P 500 Index    10.421234
dtype: float64
```

In [ ]:
```
santadailyfourth.skew()
```

Out[ ]:
```
Calendar Date                 -0.007134
Level of the S&P 500 Index     0.700403
Return on the S&P 500 Index    1.064814
Day                           -0.011893
dtype: float64
```

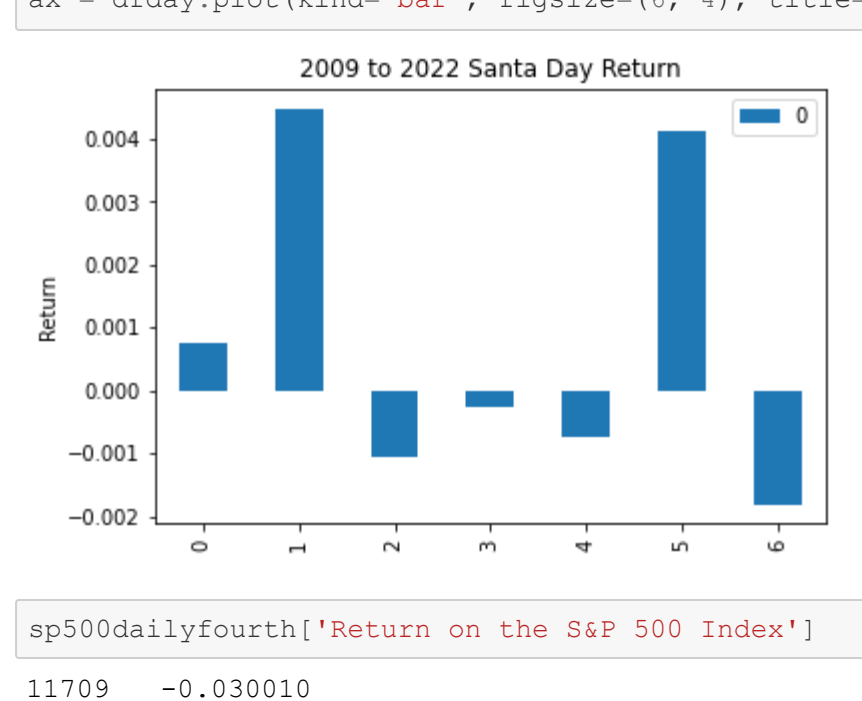
In [ ]:
```
santadailyfourth.kurt()
```

Out[ ]:
```
Calendar Date                 -1.201118
Level of the S&P 500 Index    -0.459086
Return on the S&P 500 Index    6.930342
Day                           -1.263523
dtype: float64
```

In [ ]:
```
print("The Stats summary of the first day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 1, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the second day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 2, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the third day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 3, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fourth day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 4, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the fifth day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 5, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the sixth day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 6, 'Return on the S&P 500 Index'].describe())

print("The Stats summary of the seventh day of the Santa Claus Rally is")
print(santadailyfourth.loc[santadailyfourth['Day'] == 7, 'Return on the S&P 500 Index'].describe())
```

```
The Stats summary of the first day of the Santa Claus Rally is
count    14.000000
mean      0.000741
std       0.009175
min      -0.027112
25%      -0.000392
50%       0.000932
75%       0.004826
max       0.013839
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the second day of the Santa Claus Rally is
count    14.000000
mean      0.004476
std       0.013497
min      -0.004787
25%      -0.001046
50%       0.000963
75%       0.004386
max       0.049594
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the third day of the Santa Claus Rally is
count    14.000000
mean     -0.001053
std       0.006526
min      -0.012478
25%      -0.002021
50%      -0.000151
75%       0.000972
max       0.010630
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fourth day of the Santa Claus Rally is
count    14.000000
mean     -0.000258
std       0.007169
min      -0.011050
25%      -0.004414
50%      -0.000767
75%       0.001055
max       0.017461
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the fifth day of the Santa Claus Rally is
count    14.000000
mean     -0.000747
std       0.007811
min      -0.010311
25%      -0.005047
50%      -0.002583
75%       0.003706
max       0.016942
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the sixth day of the Santa Claus Rally is
count    14.000000
mean      0.004128
std       0.011870
min      -0.015304
25%      -0.003085
50%       0.007339
75%       0.010608
max       0.025403
Name: Return on the S&P 500 Index, dtype: float64
The Stats summary of the seventh day of the Santa Claus Rally is
count    15.000000
mean     -0.001804
std       0.009145
min      -0.024757
25%      -0.003377
50%      -0.000333
75%       0.004419
max       0.007539
Name: Return on the S&P 500 Index, dtype: float64
```

In [ ]:
```
day = [santadailyfourth.loc[santadailyfourth['Day'] == 1, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 2, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 3, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 4, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 5, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 6, 'Return on the S&P 500 Index'].mean(),
       santadailyfourth.loc[santadailyfourth['Day'] == 7, 'Return on the S&P 500 Index'].mean()]

dfday = pd.DataFrame(day)
dfday

# plot
ax = dfday.plot(kind='bar', figsize=(6, 4), title='2009 to 2022 Santa Day Return', ylabel='Return')
```



In [ ]:
```
sp500dailyfourth['Return on the S&P 500 Index']
```

Out[ ]:
```
11709   -0.030010
11710    0.003397
11711   -0.021303
11712   -0.022564
11713    0.001758
           ...
15238    0.003997
15239   -0.002030
15240   -0.015563
15241   -0.007638
15242    0.018918
Name: Return on the S&P 500 Index, Length: 3534, dtype: float64
```

In [ ]:
```
santadailyfourthnew = santadailyfourth.iloc[1:,:]
santadailyfourthnew
```

Out[ ]:

	Calendar Date	Level of the S&P 500 Index	Return on the S&P 500 Index	Day
329	2009	1126.48	0.005256	1
330	2009	1127.78	0.001154	2
331	2009	1126.20	-0.001401	3
332	2009	1126.42	0.000195	4
333	2009	1115.10	-0.010050	5
...	...	...	...	...
422	2022	3783.22	-0.012021	3
423	2022	3849.28	0.017461	4
424	2022	3839.50	-0.002541	5
425	2022	3824.14	-0.004001	6
426	2022	3852.97	0.007539	7

98 rows × 4 columns

In [ ]:
```
SMLnew = SML.loc[SML['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31'
, '2010-01-04', '2010-01-05',
                                   '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
                                   '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
                                   '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
                                   '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
                                   '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
                                   '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
                                   '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
                                   '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
                                   '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
                                   '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
                                   '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
                                   '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
                                   '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])]
SMLnew
```

Out[ ]:

	Date	Close	Return
3289	2009-12-24	337.41	0.005154
3288	2009-12-28	337.09	-0.000948
3287	2009-12-29	337.12	0.000089
3286	2009-12-30	337.33	0.000623
3285	2009-12-31	332.63	-0.013933
...	...	...	...
15	2022-12-28	1137.71	-0.018928
14	2022-12-29	1162.74	0.022000
13	2022-12-30	1157.53	-0.004481
12	2023-01-03	1155.53	-0.001728
11	2023-01-04	1169.43	0.012029

98 rows × 3 columns

In [ ]:
```
MIDnew = MID.loc[MID['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31'
, '2010-01-04', '2010-01-05',
                                   '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
                                   '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
                                   '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
                                   '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
                                   '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
                                   '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
                                   '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
                                   '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
                                   '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
                                   '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
                                   '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
                                   '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
                                   '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])]
MIDnew
```

Out[ ]:

	Date	Close	Return
3289	2009-12-24	739.71	0.005109
3288	2009-12-28	739.44	-0.000365
3287	2009-12-29	737.84	-0.002164
3286	2009-12-30	736.17	-0.002263
3285	2009-12-31	726.67	-0.012905
...	...	...	...
15	2022-12-28	2394.71	-0.016861
14	2022-12-29	2441.17	0.019401
13	2022-12-30	2430.38	-0.004420
12	2023-01-03	2418.77	-0.004777
11	2023-01-04	2455.72	0.015276

98 rows × 3 columns

In [ ]:
```
stats.ttest_ind(MIDnew['Return'], santadailyfourthnew['Return on the S&P 500 Index'])
```

Out[ ]:
```
Ttest_indResult(statistic=-0.09087558796158347, pvalue=0.9276852085996578)
```

In [ ]:
```
stats.ttest_ind(SMLnew['Return'], MIDnew['Return'])
```

Out[ ]:
```
Ttest_indResult(statistic=0.015508396482786353, pvalue=0.9876425232089696)
```

In [ ]:
```
stats.ttest_ind(SMLnew['Return'], santadailyfourthnew['Return on the S&P 500 Index'])
```

Out[ ]:
```
Ttest_indResult(statistic=-0.06997101891367723, pvalue=0.9442887995162224)
```

SP Small cap 600 Index

In [ ]:
```
SML=pd.read_csv('/content/gdrive/MyDrive/SML data.csv')

SML['Date'] = pd.to_datetime(SML['Date'])

SML = SML.iloc[::-1]

SML['Return'] = SML[' Close'].pct_change()
SML = SML.dropna()

SML
```

```
<ipython-input-162-1cf6d8059f61>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  SML['Return'] = SML[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	272.28	0.013210
3535	2009-01-05	270.20	-0.007639
3534	2009-01-06	274.79	0.016987
3533	2009-01-07	265.11	-0.035227
3532	2009-01-08	266.49	0.005205
...	...	...	...
4	2023-01-13	1238.88	0.005642
3	2023-01-17	1234.50	-0.003535
2	2023-01-18	1215.10	-0.015715
1	2023-01-19	1204.70	-0.008559
0	2023-01-20	1223.39	0.015514

3537 rows × 3 columns

In [ ]:
```
SML.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	744.255816	0.000541
std	312.654185	0.014932
min	181.790000	-0.133089
25%	455.500000	-0.006655
50%	703.210000	0.000823
75%	951.470000	0.008177
max	1466.020000	0.090067

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(SML.loc[SML['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
'2010-01-04', '2010-01-05',
'2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
'2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
'2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
'2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
'2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
'2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
'2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
'2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
'2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
'2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
'2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
'2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
'2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
             Close     Return
count    98.000000  98.000000
mean    786.348776   0.000709
std     309.247220   0.010932
min     332.630000  -0.023759
25%     474.770000  -0.004418
50%     748.260000   0.000192
75%    1020.905000   0.005114
max    1426.130000   0.047893
```

In [ ]:
```
print("2009 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
'2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(SML.loc[SML['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(SML.loc[SML['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(SML.loc[SML['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(SML.loc[SML['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(SML.loc[SML['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(SML.loc[SML['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(SML.loc[SML['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(SML.loc[SML['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(SML.loc[SML['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(SML.loc[SML['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(SML.loc[SML['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(SML.loc[SML['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(SML.loc[SML['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   337.100000  0.001235
std      2.178929  0.010544
min    332.630000 -0.013933
25%    337.105000 -0.002182
50%    337.330000  0.000089
75%    337.945000  0.002888
max    339.640000  0.021074
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   419.835714 -0.001178
std      2.913754  0.011958
min    415.730000 -0.018209
25%    418.285000 -0.006812
50%    420.420000 -0.000666
75%    421.080000  0.002215
max    423.970000  0.019821
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   418.472857  0.000139
std      3.266123  0.013391
min    413.290000 -0.021266
25%    416.775000 -0.008319
50%    418.990000  0.003251
75%    420.405000  0.010006
max    422.270000  0.015612
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   476.795714  0.004065
std      8.978715  0.013453
min    467.410000 -0.007487
25%    470.485000 -0.004765
50%    474.170000 -0.000574
75%    482.870000  0.009686
max    489.280000  0.026670
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   663.408571 -0.000615
std      3.367687  0.005592
min    657.290000 -0.012396
25%    662.310000 -0.001224
50%    665.070000  0.001475
75%    665.345000  0.002426
max    666.190000  0.004214
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   694.600000 -0.002949
std      7.934694  0.007862
min    679.270000 -0.015793
25%    692.625000 -0.007103
50%    695.080000 -0.003672
75%    699.970000  0.003075
max    702.660000  0.006877
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   673.877143 -0.005074
std     12.604577  0.011496
min    655.780000 -0.023759
25%    664.755000 -0.011484
50%    680.380000 -0.004201
75%    682.015000  0.002515
max    687.440000  0.010377
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   844.947143  0.002823
std      6.700193  0.008992
min    837.960000 -0.011979
25%    840.565000 -0.000978
50%    843.360000  0.004995
75%    847.405000  0.006045
max    857.370000  0.016612
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   940.741429  0.000173
std      2.633461  0.004730
min    936.260000 -0.007568
25%    939.525000 -0.001794
50%    940.270000  0.000286
75%    943.105000  0.002458
max    943.400000  0.007167
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   832.485714  0.004254
std     18.104107  0.022283
min    793.860000 -0.019454
25%    832.345000 -0.007141
50%    835.370000  0.004195
75%    842.575000  0.005712
max    848.330000  0.047893
2019 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1021.174286 -0.000241
std       2.386663  0.002488
min    1018.020000 -0.004718
25%    1019.850000 -0.000900
50%    1020.930000 -0.000363
75%    1022.440000  0.001037
max    1024.690000  0.003104
2020 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1118.385714  0.002245
std       8.813395  0.012419
min    1106.930000 -0.015636
25%    1112.680000 -0.005465
50%    1118.930000  0.000823
75%    1123.225000  0.006342
max    1131.030000  0.021772
2021 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1409.447143  0.003966
std       9.040742  0.007112
min    1401.710000 -0.004600
25%    1402.665000 -0.001745
50%    1407.290000  0.004141
75%    1412.835000  0.008675
max    1426.130000  0.014358
2022 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1157.611429  0.002090
std       9.831916  0.013064
min    1137.710000 -0.018928
25%    1156.530000 -0.003104
50%    1159.460000  0.000879
75%    1161.710000  0.009323
max    1169.430000  0.022000
```

In [ ]:
```
print("SML day 1 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
'2014-12-24', '2015-12-24', '2016-12-23',
                          '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("SML day 2 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
'2014-12-26', '2015-12-28', '2016-12-27',
                          '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("SML day 3 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
'2014-12-29', '2015-12-29', '2016-12-28',
                          '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("SML day 4 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
'2014-12-30', '2015-12-30', '2016-12-29',
                          '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("SML day 5 Santa Return")
print(SML.loc[SML['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
'2014-12-31', '2015-12-31', '2016-12-30',
                          '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("SML day 6 Santa Return")
print(SML.loc[SML['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
'2015-01-02', '2016-01-04', '2017-01-03',
                          '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("SML day 7 Santa Return")
print(SML.loc[SML['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
'2015-01-05', '2016-01-05', '2017-01-04',
                          '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
SML day 1 Santa Return
             Close     Return
count    14.000000  14.000000
mean    784.905000   0.001561
std     318.878917   0.007618
min     337.410000  -0.019454
25%     521.915000   0.000340
50%     744.470000   0.002700
75%    1003.352500   0.004747
max    1407.290000   0.014358
SML day 2 Santa Return
             Close     Return
count    14.000000  14.000000
mean    787.862143   0.003715
std     318.829631   0.013370
min     337.090000  -0.007487
25%     519.512500  -0.002270
50%     765.870000   0.000056
75%    1002.842500   0.004998
max    1403.000000   0.047893
SML day 3 Santa Return
             Close     Return
count    14.000000  14.000000
mean    784.568571  -0.003725
std     316.572724   0.009562
min     337.120000  -0.021266
25%     519.030000  -0.010164
50%     769.015000  -0.000585
75%     999.080000   0.003108
max    1408.810000   0.010377
SML day 4 Santa Return
             Close     Return
count    14.000000  14.000000
mean    786.835714   0.000254
std     318.780069   0.008411
min     337.330000  -0.009688
25%     516.697500  -0.002962
50%     770.145000  -0.000201
75%     999.365000   0.005327
max    1402.330000   0.022000
SML day 5 Santa Return
             Close     Return
count    14.000000  14.000000
mean    785.062143  -0.002909
std     319.113858   0.008916
min     332.630000  -0.013933
25%     523.812500  -0.009859
50%     766.520000  -0.004356
75%     999.950000   0.001312
max    1401.710000   0.019597
SML day 6 Santa Return
             Close     Return
count    14.000000  14.000000
mean    786.606429   0.003971
std     318.453477   0.014363
min     339.640000  -0.023759
25%     530.905000  -0.005730
50%     766.765000   0.005228
75%    1001.365000   0.014411
max    1416.860000   0.026670
SML day 7 Santa Return
             Close     Return
count    14.000000  14.000000
mean    788.601429   0.000098
std     324.250691   0.012231
min     338.490000  -0.015611
25%     531.320000  -0.006316
50%     756.080000   0.000100
75%    1001.507500   0.005961
max    1426.130000   0.021772
```

In [ ]:
```
SML['Date'] = pd.DatetimeIndex(SML['Date']).year
SML1 = SML

SML2 = SML1.groupby('Date').agg(["mean","std"])
SML2
```

Out[ ]:

	Close		Return	
	mean	std	mean	std
Date				
2009	275.985065	38.205847	0.001092	0.022205
2010	358.355862	25.821184	0.000998	0.015028
2011	416.234246	27.237624	0.000194	0.020046
2012	451.579000	15.166757	0.000606	0.010377
2013	569.465556	49.896666	0.001306	0.008950
2014	600.867817	17.790702	0.000216	0.009284
2015	698.835357	21.548773	-0.000085	0.010017
2016	715.510992	62.986352	0.000939	0.011100
2017	863.980478	35.263150	0.000473	0.007900
2018	880.825578	62.334080	-0.000346	0.011165
2019	915.894603	32.467037	0.000804	0.010181
2020	886.781344	124.939193	0.000753	0.027830
2021	1340.577540	58.254168	0.000985	0.013802
2022	1221.747610	78.356792	-0.000954	0.016027
2023	1201.548462	28.405314	0.004328	0.011588

SP Mid cap 400 index

In [ ]:
```
MID=pd.read_csv('/content/gdrive/MyDrive/MID data.csv')

MID['Date'] = pd.to_datetime(MID['Date'])

MID = MID.iloc[::-1]

MID['Return'] = MID[' Close'].pct_change()
MID = MID.dropna()

MID
```

```
<ipython-input-172-d330a61b7281>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
  MID['Return'] = MID[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	551.34	0.024262
3535	2009-01-05	550.51	-0.001505
3534	2009-01-06	559.37	0.016094
3533	2009-01-07	541.15	-0.032572
3532	2009-01-08	545.37	0.007798
...	...	...	...
4	2023-01-13	2580.91	0.004682
3	2023-01-17	2575.61	-0.002054
2	2023-01-18	2543.36	-0.012521
1	2023-01-19	2516.89	-0.010407
0	2023-01-20	2558.46	0.016516

3537 rows × 3 columns

In [ ]:
```
MID.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	1536.308052	0.000534
std	606.844281	0.013604
min	404.620000	-0.137097
25%	984.710000	-0.005479
50%	1486.620000	0.000839
75%	1925.310000	0.007301
max	2910.700000	0.107086

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(MID.loc[MID['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
'2010-01-04', '2010-01-05',
'2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
'2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
'2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
'2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
'2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
'2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
'2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
'2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
'2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
'2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
'2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
'2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
'2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
             Close     Return
count    98.000000  98.000000
mean   1614.759694   0.000638
std     614.688785   0.009712
min     726.670000  -0.027275
25%    1020.370000  -0.003797
50%    1520.900000   0.000874
75%    2062.500000   0.004165
max    2865.540000   0.046178
```

In [ ]:
```
print("2009 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
'2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(MID.loc[MID['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(MID.loc[MID['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(MID.loc[MID['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(MID.loc[MID['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(MID.loc[MID['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(MID.loc[MID['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(MID.loc[MID['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(MID.loc[MID['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(MID.loc[MID['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(MID.loc[MID['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(MID.loc[MID['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(MID.loc[MID['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(MID.loc[MID['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   736.870000  0.000838
std      4.495342  0.008701
min    726.670000 -0.012905
25%    737.005000 -0.002214
50%    738.150000 -0.000365
75%    739.575000  0.003882
max    740.110000  0.015798
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   912.072857 -0.000135
std      3.985815  0.007855
min    907.250000 -0.011012
25%    909.920000 -0.004174
50%    911.750000  0.000679
75%    912.890000  0.001901
max    919.890000  0.013932
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   882.764286  0.001012
std      5.821598  0.010596
min    871.340000 -0.018042
25%    881.160000 -0.003610
50%    884.910000  0.002757
75%    886.435000  0.008012
max    887.910000  0.013565
2012 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1023.297143  0.003640
std      17.298891  0.012475
min    1004.330000 -0.008262
25%    1011.720000 -0.004532
50%    1020.350000 -0.000415
75%    1033.375000  0.008918
max    1048.210000  0.025372
2013 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1335.551429  0.000531
std       4.366087  0.005154
min    1328.230000 -0.010652
25%    1334.100000  0.000704
50%    1335.390000  0.001429
75%    1337.255000  0.003676
max    1342.530000  0.004178
2014 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1457.954286 -0.003164
std      15.485034  0.007527
min    1428.480000 -0.015731
25%    1451.875000 -0.007471
50%    1463.350000 -0.000778
75%    1467.850000  0.002438
max    1474.400000  0.004428
2015 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1403.652857 -0.003560
std      18.026776  0.007437
min    1379.180000 -0.013871
25%    1389.445000 -0.009115
50%    1413.110000 -0.001582
75%    1414.980000  0.000643
max    1424.430000  0.007476
2016 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1672.825714  0.002264
std      12.119891  0.008096
min    1660.580000 -0.010546
25%    1664.845000 -0.000702
50%    1669.900000  0.002809
75%    1676.890000  0.004802
max    1695.830000  0.015528
2017 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1909.771429  0.001366
std       8.067801  0.004393
min    1900.570000 -0.005604
25%    1905.050000 -0.000213
50%    1905.730000  0.000604
75%    1914.320000  0.003076
max    1923.360000  0.008834
2018 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1636.205714  0.002010
std      32.114716  0.023211
min    1567.400000 -0.027275
25%    1635.670000 -0.009489
50%    1646.490000 -0.004555
75%    1652.585000  0.007301
max    1663.040000  0.046178
2019 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2062.310000 -0.000533
std       3.693327  0.002473
min    2055.670000 -0.004610
25%    2061.040000 -0.001600
50%    2062.880000 -0.000984
75%    2064.105000  0.001084
max    2067.330000  0.002896
2020 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2298.667143 -0.000511
std      16.145115  0.011067
min    2269.450000 -0.016114
25%    2293.420000 -0.006788
50%    2302.880000  0.001501
75%    2308.070000  0.004947
max    2315.360000  0.014717
2021 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2844.452857  0.003537
std      11.605217  0.005278
min    2832.240000 -0.002995
25%    2836.255000  0.000304
50%    2842.000000  0.003184
75%    2849.440000  0.005259
max    2865.540000  0.013363
2022 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2430.240000  0.002315
std      19.224361  0.012601
min    2394.710000 -0.016861
25%    2424.575000 -0.004599
50%    2435.150000  0.000259
75%    2438.475000  0.011301
max    2455.720000  0.019401
```

In [ ]:
```
print("MID day 1 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
'2014-12-24', '2015-12-24', '2016-12-23',
                          '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("MID day 2 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
'2014-12-26', '2015-12-28', '2016-12-27',
                          '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("MID day 3 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
'2014-12-29', '2015-12-29', '2016-12-28',
                          '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("MID day 4 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
'2014-12-30', '2015-12-30', '2016-12-29',
                          '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("MID day 5 Santa Return")
print(MID.loc[MID['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
'2014-12-31', '2015-12-31', '2016-12-30',
                          '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("MID day 6 Santa Return")
print(MID.loc[MID['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
'2015-01-02', '2016-01-04', '2017-01-03',
                          '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("MID day 7 Santa Return")
print(MID.loc[MID['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
'2015-01-05', '2016-01-05', '2017-01-04',
                          '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
MID day 1 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1611.512143   0.000904
std     633.934435   0.009639
min     739.710000  -0.027275
25%    1098.867500  -0.000120
50%    1515.375000   0.001634
75%    2022.165000   0.004863
max    2833.180000   0.013363
MID day 2 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1616.897143   0.003260
std     634.193550   0.012730
min     739.460000  -0.008252
25%    1092.795000  -0.001278
50%    1553.840000   0.000431
75%    2026.930000   0.002861
max    2832.240000   0.046178
MID day 3 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1612.362857  -0.002569
std     631.076955   0.008297
min     737.840000  -0.018042
25%    1092.707500  -0.008451
50%    1560.820000  -0.000263
75%    2023.540000   0.004008
max    2847.830000   0.007476
MID day 4 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1616.073571   0.001636
std     635.929318   0.007645
min     736.170000  -0.007947
25%    1087.800000  -0.002804
50%    1557.145000   0.002112
75%    2023.360000   0.002969
max    2839.330000   0.019401
MID day 5 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1613.805000  -0.003835
std     636.569340   0.008026
min     726.670000  -0.012905
25%    1100.955000  -0.006288
50%    1556.510000  -0.004189
75%    2022.407500   0.001497
max    2842.000000   0.016031
MID day 6 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1614.331429   0.002462
std     630.619788   0.011835
min     738.150000  -0.016114
25%    1116.797500  -0.004351
50%    1554.620000   0.002118
75%    2028.232500   0.009673
max    2851.050000   0.025372
MID day 7 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1618.335714   0.000390
std     640.004066   0.010351
min     740.110000  -0.015905
25%    1119.602500  -0.004130
50%    1530.020000   0.002231
75%    2022.592500   0.004856
max    2865.540000   0.015528
```

In [ ]:
```
MID['Date'] = pd.DatetimeIndex(MID['Date']).year
MID1 = MID

MID2 = MID1.groupby('Date').agg(["mean","std"])
MID2
```

Out[ ]:

	Close		Return	
	mean	std	mean	std
Date				
2009	595.105040	86.384328	0.001399	0.020414
2010	786.220000	53.665846	0.001062	0.012748
2011	916.268333	64.247792	0.000037	0.018008
2012	966.708560	32.702916	0.000642	0.009590
2013	1195.843135	75.233994	0.001124	0.008316
2014	1385.410754	42.366256	0.000346	0.008190
2015	1473.095317	50.217228	-0.000106	0.009388
2016	1486.856944	106.993616	0.000730	0.009891
2017	1759.085259	61.737110	0.000556	0.006052
2018	1921.705976	89.039208	-0.000480	0.010138
2019	1918.474167	71.556278	0.000896	0.009031
2020	1878.527075	236.835367	0.000772	0.025545
2021	2675.525675	122.553642	0.000892	0.011304
2022	2496.368088	149.041394	-0.000392	0.016238
2023	2514.512308	54.519033	0.004022	0.011720

SP 500 IT sector index

```
In [ ]: INFT=pd.read_csv('/content/gdrive/MyDrive/S5INFT data.csv')

INFT['Date'] = pd.to_datetime(INFT['Date'])

INFT = INFT.iloc[::-1]

INFT['Return'] = INFT[' Close'].pct_change()
INFT = INFT.dropna()

INFT
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	241.74	0.042837
3535	2009-01-05	241.94	0.000827
3534	2009-01-06	249.27	0.030297
3533	2009-01-07	240.10	-0.036787
3532	2009-01-08	242.18	0.008663
...	...	...	...
4	2023-01-13	2276.98	0.003402
3	2023-01-17	2286.94	0.004374
2	2023-01-18	2257.62	-0.012821
1	2023-01-19	2231.84	-0.011419
0	2023-01-20	2292.54	0.027197

3537 rows × 3 columns

```
In [ ]: INFT.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	1045.057882	0.000749
std	748.583261	0.014205
min	199.620000	-0.139149
25%	465.450000	-0.005462
50%	717.970000	0.001101
75%	1374.820000	0.007537
max	3107.460000	0.119635

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
print(INFT.loc[INFT['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05',
 '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
 '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
 '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
 '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
 '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
 '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
 '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
 '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
 '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
 '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
 '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
 '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
 '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count    98.000000  98.000000
mean   1127.683878   0.000310
std     815.567809   0.012576
min     370.710000  -0.050678
25%     463.002500  -0.006068
50%     772.820000  -0.000196
75%    1613.547500   0.004533
max    3107.460000   0.060496
```

```
In [ ]: print("2009 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   373.937143  0.002864
std      2.073288  0.008472
min    370.710000 -0.010939
25%    372.885000 -0.000668
50%    373.480000  0.002200
75%    375.570000  0.007306
max    376.460000  0.015511
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   406.720000  0.001701
std      2.065946  0.004755
min    404.550000 -0.002072
25%    405.585000 -0.001071
50%    405.850000  0.001010
75%    407.775000  0.001610
max    409.920000  0.011890
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   412.641429  0.003669
std      3.557679  0.009355
min    407.990000 -0.010454
25%    410.845000 -0.001579
50%    411.770000  0.002591
75%    414.565000  0.009934
max    417.910000  0.016832
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   464.717143  0.003286
std      8.788812  0.016448
min    454.020000 -0.011582
25%    459.570000 -0.006834
50%    462.730000 -0.003789
75%    469.360000  0.010292
max    478.410000  0.031456
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   581.255714 -0.000889
std      2.846377  0.005805
min    576.470000 -0.010658
25%    580.250000 -0.003369
50%    581.320000 -0.001169
75%    582.510000  0.002539
max    585.480000  0.007260
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   697.397143 -0.005693
std     10.731922  0.007317
min    678.720000 -0.017658
25%    691.435000 -0.009485
50%    700.340000 -0.004896
75%    705.555000 -0.001218
max    708.740000  0.004109
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   723.434286 -0.004167
std     11.191850  0.009875
min    707.250000 -0.015551
25%    715.870000 -0.011043
50%    727.490000 -0.004238
75%    729.935000 -0.000350
max    737.690000  0.013408
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   816.670000 -0.000198
std      4.788201  0.006888
min    807.950000 -0.009829
25%    815.545000 -0.004574
50%    816.300000  0.000708
75%    818.925000  0.004005
max    823.500000  0.008874
2017 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1116.377143  0.001975
std       9.293357  0.007962
min    1106.180000 -0.006950
25%    1110.930000 -0.003435
50%    1112.990000  0.001043
75%    1119.810000  0.006240
max    1133.990000  0.014130
2018 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1064.831429 -0.000295
std      30.135966  0.034467
min    1011.310000 -0.050678
25%    1053.170000 -0.014888
50%    1078.060000  0.000671
75%    1084.535000  0.008609
max    1089.040000  0.060496
2019 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1615.520000  0.001794
std      12.202946  0.009089
min    1602.480000 -0.010640
25%    1608.160000 -0.002846
50%    1614.340000  0.000387
75%    1618.190000  0.005576
max    1639.120000  0.017348
2020 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2277.771429  0.000811
std      16.338241  0.009944
min    2250.170000 -0.017942
25%    2268.265000 -0.002724
50%    2284.470000  0.002981
75%    2288.125000  0.007233
max    2296.980000  0.011618
2021 Santa Return
           Close    Return
count     7.0000  7.000000
mean   3078.8600  0.000544
std      20.4542  0.011650
min    3051.4800 -0.011426
25%    3062.9350 -0.006341
50%    3086.7500 -0.004876
75%    3090.2300  0.005488
max    3107.4600  0.021814
2022 Santa Return
             Close    Return
count     7.000000  7.000000
mean   2157.441429 -0.001053
std      19.967475  0.013931
min    2118.970000 -0.016436
25%    2152.345000 -0.009895
50%    2155.820000 -0.001255
75%    2173.535000  0.001856
max    2175.540000  0.026395
```

```
In [ ]: print("day 1 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
 '2014-12-24', '2015-12-24', '2016-12-23',
 '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("day 2 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
 '2014-12-26', '2015-12-28', '2016-12-27',
 '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("day 3 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
 '2014-12-29', '2015-12-29', '2016-12-28',
 '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("day 4 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
 '2014-12-30', '2015-12-30', '2016-12-29',
 '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("day 5 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
 '2014-12-31', '2015-12-31', '2016-12-30',
 '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("day 6 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
 '2015-01-02', '2016-01-04', '2017-01-03',
 '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("day 7 Santa Return")
print(INFT.loc[INFT['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
 '2015-01-05', '2016-01-05', '2017-01-04',
 '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
day 1 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1126.620714   0.001572
std     847.622635   0.010676
min     372.660000  -0.027278
25%     492.377500  -0.000899
50%     773.665000   0.000929
75%    1481.312500   0.006110
max    3107.460000   0.021814
day 2 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1130.852143   0.004724
std     844.931187   0.017115
min     373.480000  -0.009726
25%     490.620000  -0.004474
50%     775.715000   0.001756
75%    1488.262500   0.004375
max    3089.100000   0.060496
day 3 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1127.887143  -0.001786
std     841.131269   0.007400
min     373.110000  -0.016436
25%     489.990000  -0.005145
50%     776.995000  -0.000996
75%    1488.982500   0.000941
max    3091.360000   0.013408
day 4 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1128.677857  -0.000290
std     842.594058   0.009362
min     374.810000  -0.011582
25%     485.830000  -0.006559
50%     773.955000  -0.001569
75%    1482.110000   0.000728
max    3070.420000   0.026395
day 5 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1127.173571  -0.001482
std     841.237900   0.009815
min     370.710000  -0.014291
25%     494.235000  -0.008901
50%     764.715000  -0.003270
75%    1484.922500   0.003558
max    3055.450000   0.021585
day 6 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1129.557143   0.005089
std     840.211216   0.014565
min     376.460000  -0.017942
25%     503.617500  -0.007920
50%     762.690000   0.009559
75%    1509.792500   0.015166
max    3086.750000   0.031456
day 7 Santa Return
             Close     Return
count    14.000000  14.000000
mean   1123.018571  -0.005655
std     836.380614   0.015103
min     376.330000  -0.050678
25%     500.292500  -0.009814
50%     762.630000  -0.002292
75%    1499.757500   0.002584
max    3051.480000   0.010857
```

SP 500 Health Care sector Index

```
In [ ]: HLTH=pd.read_csv('/content/gdrive/MyDrive/S5HLTH data.csv')

HLTH['Date'] = pd.to_datetime(HLTH['Date'])

HLTH = HLTH.iloc[::-1]

HLTH['Return'] = HLTH[' Close'].pct_change()
HLTH = HLTH.dropna()

HLTH
```

```
<ipython-input-79-5102da95c4e4>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  HLTH['Return'] = HLTH[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	316.22	0.022010
3535	2009-01-05	313.30	-0.009234
3534	2009-01-06	308.76	-0.014491
3533	2009-01-07	305.79	-0.009619
3532	2009-01-08	307.48	0.005527
...	...	...	...
4	2023-01-13	1579.53	0.004726
3	2023-01-17	1571.65	-0.004989
2	2023-01-18	1549.37	-0.014176
1	2023-01-19	1552.99	0.002336
0	2023-01-20	1561.79	0.005666

3537 rows × 3 columns

```
In [ ]: HLTH.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	829.700319	0.000515
std	386.854342	0.010689
min	252.840000	-0.099922
25%	437.310000	-0.004361
50%	820.250000	0.000803
75%	1063.580000	0.006090
max	1664.580000	0.075879

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
print(HLTH.loc[HLTH['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05',
 '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
 '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
 '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
 '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
 '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
 '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
 '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
 '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
 '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
 '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
 '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
 '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
 '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count    98.000000  98.000000
mean    881.301633   0.000578
std     413.337343   0.009099
min     362.220000  -0.024885
25%     463.400000  -0.004040
50%     815.485000   0.000481
75%    1189.887500   0.005278
max    1650.430000   0.045430
```

```
In [ ]: print("2009 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   365.921429 -0.000364
std      1.816539  0.007961
min    362.220000 -0.011516
25%    365.575000 -0.003771
50%    366.440000 -0.001145
75%    367.060000  0.001872
max    367.520000  0.013914
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   366.642857  0.001146
std      1.844611  0.004578
min    364.780000 -0.002780
25%    365.565000 -0.001954
50%    366.010000  0.000301
75%    367.365000  0.002078
max    369.850000  0.010253
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   403.548571  0.001711
std      2.555096  0.009195
min    399.330000 -0.011853
25%    402.515000 -0.004299
50%    403.680000  0.001090
75%    404.665000  0.008741
max    407.470000  0.013859
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   464.822857  0.001835
std      5.279807  0.010075
min    457.390000 -0.010535
25%    462.525000 -0.003674
50%    462.950000 -0.001145
75%    468.140000  0.006672
max    472.090000  0.018533
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   640.814286  0.000337
std      1.870605  0.003767
min    638.050000 -0.005527
25%    639.410000 -0.001061
50%    641.500000 -0.000638
75%    642.310000  0.001976
max    642.710000  0.006692
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   796.588571  0.000106
std      4.807194  0.006746
min    790.220000 -0.009790
25%    793.475000 -0.005086
50%    795.070000  0.002572
75%    800.405000  0.005275
max    803.070000  0.007585
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   832.940000 -0.002633
std      9.967343  0.010162
min    817.310000 -0.019106
25%    827.550000 -0.006780
50%    834.460000 -0.004558
75%    839.540000  0.003303
max    844.630000  0.012188
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   803.732857  0.002887
std      5.803748  0.007246
min    796.910000 -0.007231
25%    799.440000 -0.001331
50%    803.780000  0.001344
75%    806.450000  0.007396
max    813.660000  0.013966
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   964.084286  0.002122
std      6.921640  0.006871
min    956.320000 -0.007277
25%    960.410000 -0.001343
50%    962.490000  0.000873
75%    965.715000  0.005812
max    977.530000  0.012318
2018 Santa Return
             Close    Return
count     7.000000  7.000000
mean    977.132857  0.001407
std      21.868798  0.024667
min     934.180000 -0.024885
25%     971.185000 -0.017844
50%     987.070000  0.000415
75%     987.565000  0.012287
max    1001.180000  0.045430
2019 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1188.714286 -0.001675
std       4.707232  0.004302
min    1180.330000 -0.008501
25%    1186.430000 -0.003874
50%    1190.450000 -0.000996
75%    1192.110000  0.001266
max    1193.140000  0.002988
2020 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1312.567143  0.003164
std       9.926834  0.005250
min    1299.880000 -0.005378
25%    1306.220000  0.001199
50%    1309.080000  0.002685
75%    1320.450000  0.005520
max    1325.670000  0.011405
2021 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1636.542857 -0.001759
std      15.616677  0.008534
min    1605.310000 -0.013828
25%    1632.895000 -0.006869
50%    1642.590000 -0.002813
75%    1645.840000  0.003799
max    1650.430000  0.010470
2022 Santa Return
             Close    Return
count     7.000000  7.000000
mean   1584.170000 -0.000195
std       5.371812  0.005514
min    1574.230000 -0.006362
25%    1582.640000 -0.003063
50%    1584.910000 -0.002657
75%    1587.035000  0.001659
max    1590.700000  0.010462
```

```
In [ ]: print("day 1 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
 '2014-12-24', '2015-12-24', '2016-12-23',
 '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("day 2 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
 '2014-12-26', '2015-12-28', '2016-12-27',
 '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("day 3 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
 '2014-12-29', '2015-12-29', '2016-12-28',
 '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("day 4 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
 '2014-12-30', '2015-12-30', '2016-12-29',
 '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("day 5 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
 '2014-12-31', '2015-12-31', '2016-12-30',
 '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("day 6 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
 '2015-01-02', '2016-01-04', '2017-01-03',
 '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("day 7 Santa Return")
print(HLTH.loc[HLTH['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
 '2015-01-05', '2016-01-05', '2017-01-04',
 '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
day 1 Santa Return
             Close     Return
count    14.000000  14.000000
mean    878.135714   0.000061
std     426.826219   0.008481
min     365.900000  -0.024885
25%     508.075000  -0.002334
50%     821.040000   0.000208
75%    1134.890000   0.005574
max    1642.590000   0.010470
day 2 Santa Return
             Close     Return
count    14.000000  14.000000
mean    881.269286   0.003885
std     426.128323   0.012520
min     366.010000  -0.004581
25%     507.672500  -0.002288
50%     819.660000   0.000826
75%    1137.952500   0.003786
max    1637.970000   0.045430
day 3 Santa Return
             Close     Return
count    14.000000  14.000000
mean    882.572143   0.000658
std     427.406036   0.006576
min     366.210000  -0.011853
25%     507.070000  -0.001666
50%     823.850000   0.000592
75%    1141.135000   0.003923
max    1647.760000   0.012188
day 4 Santa Return
             Close     Return
count    14.000000  14.000000
mean    882.928571  -0.000269
std     429.615092   0.005596
min     365.230000  -0.010535
25%     503.720000  -0.003723
50%     820.310000   0.000212
75%    1135.365000   0.001466
max    1650.430000   0.010462
day 5 Santa Return
             Close     Return
count    14.000000  14.000000
mean    882.530714  -0.000922
std     429.965320   0.008228
min     362.220000  -0.011516
25%     507.787500  -0.006444
50%     815.070000  -0.003147
75%    1141.445000   0.002082
max    1643.920000   0.013874
day 6 Santa Return
             Close     Return
count    14.000000  14.000000
mean    881.845000   0.002318
std     424.836406   0.011885
min     367.260000  -0.019106
25%     513.335000  -0.005490
50%     812.675000   0.002904
75%    1139.750000   0.013474
max    1627.820000   0.018533
day 7 Santa Return
             Close     Return
count    14.000000  14.000000
mean    879.830000  -0.001686
std     422.374599   0.009030
min     365.150000  -0.022174
25%     514.085000  -0.006011
50%     817.765000   0.001627
75%    1129.630000   0.005087
max    1605.310000   0.009741
```

SP 500 Consumer Discretionary sector Index

```
In [ ]: COND=pd.read_csv('/content/drive/MyDrive/SSCOND data.csv')

COND['Date'] = pd.to_datetime(COND['Date'])

COND = COND.iloc[::-1]

COND['Return'] = COND[' Close'].pct_change()
COND = COND.dropna()

COND
```

```
<ipython-input-84-97ee82948fa8>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  COND['Return'] = COND[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3535	2009-01-02	177.33	0.046750
3534	2009-01-05	177.37	0.000226
3533	2009-01-06	180.56	0.017985
3532	2009-01-07	174.21	-0.035168
3531	2009-01-08	174.78	0.003272
...	...	...	...
4	2023-01-13	1087.35	0.009741
3	2023-01-17	1088.11	0.000699
2	2023-01-18	1073.99	-0.012977
1	2023-01-19	1055.81	-0.016928
0	2023-01-20	1081.81	0.024626

3536 rows × 3 columns

```
In [ ]: COND.describe()
```

Out[ ]:

	Close	Return
count	3536.000000	3536.000000
mean	685.615020	0.000615
std	375.071271	0.013414
min	125.720000	-0.120825
25%	352.960000	-0.005184
50%	620.435000	0.001211
75%	929.367500	0.007180
max	1673.270000	0.086392

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
print(COND.loc[COND['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05',
 '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
 '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
 '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
 '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
 '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
 '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
 '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
 '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
 '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
 '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
 '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
 '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
 '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   718.941735   0.001466
std    387.763291   0.011094
min    235.070000  -0.021819
25%    375.460000  -0.004061
50%    639.945000   0.001235
75%    985.922500   0.006098
max   1655.170000   0.062781
```

```
In [ ]: print("2009 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(COND.loc[COND['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(COND.loc[COND['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(COND.loc[COND['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(COND.loc[COND['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(COND.loc[COND['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(COND.loc[COND['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(COND.loc[COND['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(COND.loc[COND['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(COND.loc[COND['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(COND.loc[COND['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(COND.loc[COND['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(COND.loc[COND['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(COND.loc[COND['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
           Close    Return
count   7.000000  7.000000
mean  237.254286 -0.000023
std     1.135413  0.005452
min   235.070000 -0.009815
25%   236.930000 -0.002203
50%   237.620000  0.001136
75%   237.920000  0.003504
max   238.390000  0.005913
2010 Santa Return
           Close    Return
count   7.000000  7.000000
mean  296.715714  0.000073
std     1.241221  0.005950
min   295.540000 -0.005916
25%   295.995000 -0.002645
50%   296.420000 -0.002260
75%   296.940000  0.000829
max   299.180000  0.012316
2011 Santa Return
           Close    Return
count   7.000000  7.000000
mean  310.264286  0.003268
std     2.120518  0.008904
min   307.010000 -0.011909
25%   309.340000 -0.001740
50%   310.270000  0.007192
75%   311.090000  0.009992
max   313.710000  0.011086
2012 Santa Return
           Close    Return
count   7.000000  7.000000
mean  376.111429  0.004017
std     6.313376  0.012552
min   368.670000 -0.009833
25%   371.770000 -0.003898
50%   375.260000  0.001922
75%   380.145000  0.011051
max   385.020000  0.021725
2013 Santa Return
           Close    Return
count   7.000000  7.000000
mean  527.134286  0.000847
std     1.804271  0.004427
min   524.460000 -0.005018
25%   526.065000 -0.002985
50%   527.440000  0.002696
75%   527.905000  0.003890
max   530.100000  0.006445
2014 Santa Return
           Close    Return
count   7.000000  7.000000
mean  570.492857 -0.003417
std     6.455431  0.008875
min   557.310000 -0.019873
25%   569.260000 -0.005503
50%   572.750000 -0.003549
75%   573.950000  0.001888
max   576.970000  0.006735
2015 Santa Return
           Close    Return
count   7.000000  7.000000
mean  621.051429 -0.003705
std     8.691297  0.009352
min   608.840000 -0.017922
25%   615.455000 -0.008779
50%   623.390000 -0.002624
75%   626.075000  0.000455
max   632.070000  0.011263
2016 Santa Return
           Close    Return
count   7.000000  7.000000
mean  654.952857  0.000492
std     4.323913  0.007744
min   647.820000 -0.009313
25%   652.860000 -0.004356
50%   654.890000 -0.001496
75%   657.880000  0.004831
max   660.480000  0.013301
2017 Santa Return
           Close    Return
count   7.000000  7.000000
mean  791.654286  0.002138
std     5.643642  0.006917
min   785.330000 -0.006616
25%   788.455000 -0.001823
50%   790.110000  0.002271
75%   793.885000  0.003915
max   801.460000  0.015127
2018 Santa Return
           Close    Return
count   7.000000  7.000000
mean  768.280000  0.006629
std    20.982828  0.028097
min   723.470000 -0.021819
25%   769.820000 -0.008874
50%   771.540000  0.002997
75%   777.280000  0.010097
max   788.750000  0.062781
2019 Santa Return
           Close    Return
count   7.000000  7.000000
mean  988.772857  0.002119
std     6.773359  0.008832
min   977.430000 -0.008518
25%   985.555000 -0.003327
50%   990.500000  0.001301
75%   991.680000  0.007195
max   999.010000  0.014313
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean  1294.858571  0.002611
std      9.234687  0.007979
min   1277.280000 -0.011293
25%   1291.950000  0.000660
50%   1298.650000  0.002168
75%   1300.710000  0.005694
max   1302.760000  0.014695
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean  1626.252857  0.003579
std     16.624941  0.011623
min   1610.760000 -0.006706
25%   1616.435000 -0.003336
50%   1619.340000  0.001169
75%   1632.815000  0.004847
max   1655.170000  0.027571
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean  1001.388571  0.001893
std     10.776614  0.014557
min    983.060000 -0.016417
25%    995.545000 -0.007235
50%   1005.480000 -0.002817
75%   1008.210000  0.010630
max   1013.670000  0.025695
```

```
In [ ]: print("day 1 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
 '2014-12-24', '2015-12-24', '2016-12-23',
 '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("day 2 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
 '2014-12-26', '2015-12-28', '2016-12-27',
 '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("day 3 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
 '2014-12-29', '2015-12-29', '2016-12-28',
 '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("day 4 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
 '2014-12-30', '2015-12-30', '2016-12-29',
 '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("day 5 Santa Return")
print(COND.loc[COND['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
 '2014-12-31', '2015-12-31', '2016-12-30',
 '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("day 6 Santa Return")
print(COND.loc[COND['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
 '2015-01-02', '2016-01-04', '2017-01-03',
 '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("day 7 Santa Return")
print(COND.loc[COND['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
 '2015-01-05', '2016-01-05', '2017-01-04',
 '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   713.305000   0.003249
std    396.334827   0.007299
min    237.950000  -0.020166
25%    412.560000  -0.002283
50%    640.060000   0.002218
75%    930.152500   0.002502
max   1617.450000   0.011086
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   718.669286   0.006188
std    398.835314   0.018189
min    237.890000  -0.016617
25%    412.525000  -0.002575
50%    642.030000   0.002581
75%    941.092500   0.006237
max   1619.340000   0.062781
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   718.466429   0.002015
std    399.168803   0.005891
min    238.390000  -0.011908
25%    410.477500  -0.000035
50%    643.480000   0.001273
75%    934.442500   0.002356
max   1621.560000   0.011263
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   719.379286   0.000763
std    399.728342   0.008959
min    237.400000  -0.017872
25%    408.495000  -0.004087
50%    640.515000  -0.001136
75%    936.255000   0.003001
max   1615.420000   0.025695
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   718.499286  -0.001157
std    398.930606   0.006799
min    235.070000  -0.009815
25%    414.570000  -0.006323
50%    634.420000  -0.002851
75%    936.050000   0.001091
max   1610.760000   0.020045
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   722.615714   0.005213
std    404.863598   0.013027
min    236.460000  -0.017922
25%    420.032500  -0.005665
50%    630.850000   0.007718
75%    948.560000   0.012765
max   1655.170000   0.027571
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   721.886429  -0.000838
std    404.389808   0.011019
min    237.620000  -0.021819
25%    420.297500  -0.006509
50%    634.660000   0.000147
75%    943.240000   0.004707
max   1644.070000   0.014137
```

SP 500 Industrials sector Index

```
In [ ]: INDU=pd.read_csv('/content/drive/MyDrive/SSINDU data.csv')

INDU['Date'] = pd.to_datetime(INDU['Date'])

INDU = INDU.iloc[::-1]

INDU['Return'] = INDU[' Close'].pct_change()
INDU = INDU.dropna()

INDU
```

```
<ipython-input-89-ac4eb705c4c9>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  INDU['Return'] = INDU[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3535	2009-01-02	215.83	0.041600
3534	2009-01-05	214.70	-0.005236
3533	2009-01-06	218.05	0.015603
3532	2009-01-07	209.69	-0.038340
3531	2009-01-08	210.52	0.003958
...	...	...	...
4	2023-01-13	867.03	-0.001233
3	2023-01-17	859.73	-0.008420
2	2023-01-18	843.87	-0.018448
1	2023-01-19	826.29	-0.020833
0	2023-01-20	837.89	0.014039

3536 rows × 3 columns

```
In [ ]: INDU.describe()
```

Out[ ]:

	Close	Return
count	3536.000000	3536.000000
mean	503.152766	0.000485
std	194.553117	0.013383
min	132.830000	-0.114453
25%	321.017500	-0.005261
50%	483.580000	0.000822
75%	639.215000	0.006760
max	905.630000	0.127506

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
print(INDU.loc[INDU['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05',
 '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
'2011-01-03', '2011-01-04',
 '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
'2012-01-03', '2012-01-04',
 '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
'2013-01-02', '2013-01-03',
 '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
'2014-01-02', '2014-01-03',
 '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
'2015-01-02', '2015-01-05',
 '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
'2016-01-04', '2016-01-05',
 '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
'2017-01-03', '2017-01-04',
 '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
'2018-01-02', '2018-01-03',
 '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
'2019-01-02', '2019-01-03',
 '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
'2020-01-02', '2020-01-03',
 '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
'2021-01-04', '2021-01-05',
 '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
'2022-01-03', '2022-01-04',
 '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
'2023-01-03', '2023-01-04',])].describe())
```

```
           Close     Return
count  98.000000  98.000000
mean  532.176224   0.000879
std   198.958796   0.010636
min   242.990000  -0.031415
25%   328.202500  -0.003146
50%   500.675000   0.000612
75%   691.002500   0.005299
max   905.630000   0.048020
```

```
In [ ]: print("2009 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
           Close    Return
count   7.000000  7.000000
mean  246.327143  0.001373
std     1.579870  0.009025
min   242.990000 -0.013118
25%   246.310000 -0.001945
50%   246.700000  0.001948
75%   246.995000  0.003856
max   247.990000  0.016955
2010 Santa Return
           Close    Return
count   7.000000  7.000000
mean  301.752857  0.001164
std     1.024658  0.002959
min   300.780000 -0.001759
25%   301.145000 -0.000562
50%   301.310000  0.000930
75%   302.285000  0.001397
max   303.320000  0.007306
2011 Santa Return
           Close    Return
count   7.000000  7.000000
mean  294.970000  0.003622
std     3.291205  0.011931
min   290.370000 -0.014526
25%   293.165000 -0.003755
50%   294.650000  0.004859
75%   296.790000  0.010849
max   299.860000  0.020833
2012 Santa Return
           Close    Return
count   7.000000  7.000000
mean  329.405714  0.003257
std     5.174491  0.012847
min   322.710000 -0.011669
25%   326.735000 -0.003075
50%   328.020000 -0.001315
75%   332.565000  0.009165
max   336.510000  0.023605
2013 Santa Return
           Close    Return
count   7.000000  7.000000
mean  449.521429  0.000774
std     2.086428  0.006687
min   446.640000 -0.012863
25%   447.870000 -0.000699
50%   450.340000  0.002709
75%   450.735000  0.005047
max   452.460000  0.006877
2014 Santa Return
           Close    Return
count   7.000000  7.000000
mean  488.511429 -0.005569
std     7.092333  0.008673
min   474.470000 -0.023202
25%   486.105000 -0.007496
50%   491.510000 -0.001501
75%   493.770000  0.000091
max   493.850000  0.000527
2015 Santa Return
           Close    Return
count   7.000000  7.000000
mean  463.994286 -0.002838
std     4.919671  0.007586
min   456.940000 -0.014217
25%   460.705000 -0.007192
50%   465.920000 -0.001864
75%   466.710000  0.000633
max   470.270000  0.009336
2016 Santa Return
           Close    Return
count   7.000000  7.000000
mean  542.267143 -0.000018
std     2.910497  0.005619
min   538.070000 -0.009874
25%   540.375000 -0.002230
50%   541.640000  0.000698
75%   544.770000  0.003438
max   545.870000  0.006635
2017 Santa Return
           Close    Return
count   7.000000  7.000000
mean  639.781429  0.002133
std     3.405414  0.003439
min   636.690000 -0.002892
25%   637.415000  0.000424
50%   638.620000  0.001629
75%   641.155000  0.003878
max   646.020000  0.007588
2018 Santa Return
           Close    Return
count   7.000000  7.000000
mean  532.838571  0.001548
std    12.478399  0.027194
min   507.500000 -0.031415
25%   530.185000 -0.016397
50%   536.750000  0.004501
75%   540.325000  0.011263
max   544.600000  0.048020
2019 Santa Return
           Close    Return
count   7.000000  7.000000
mean  692.457143  0.001441
std     5.176491  0.007792
min   687.400000 -0.005699
25%   688.795000 -0.002283
50%   691.340000 -0.000361
75%   695.410000  0.001305
max   700.050000  0.018106
2020 Santa Return
           Close    Return
count   7.000000  7.000000
mean  741.735714 -0.001032
std     6.239618  0.012077
min   730.440000 -0.025482
25%   738.985000 -0.003019
50%   744.100000  0.001357
75%   745.050000  0.006371
max   749.540000  0.010199
2021 Santa Return
           Close    Return
count   7.000000  7.000000
mean  893.620000  0.004261
std     6.001991  0.009377
min   887.590000 -0.008235
25%   889.780000 -0.001139
50%   893.070000  0.004411
75%   894.745000  0.007803
max   905.630000  0.020325
2022 Santa Return
           Close    Return
count   7.000000  7.000000
mean  833.284286  0.002189
std     4.862914  0.008521
min   824.600000 -0.013141
25%   832.130000 -0.000942
50%   833.120000  0.003266
75%   835.140000  0.007417
max   840.730000  0.012248
```

```
In [ ]: print("day 1 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
 '2014-12-24', '2015-12-24', '2016-12-23',
 '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
'2022-12-23'])].describe())
print("day 2 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
 '2014-12-26', '2015-12-28', '2016-12-27',
 '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
'2022-12-27'])].describe())
print("day 3 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
 '2014-12-29', '2015-12-29', '2016-12-28',
 '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
'2022-12-28'])].describe())
print("day 4 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
 '2014-12-30', '2015-12-30', '2016-12-29',
 '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
'2022-12-29'])].describe())
print("day 5 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
 '2014-12-31', '2015-12-31', '2016-12-30',
 '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
'2022-12-30'])].describe())
print("day 6 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
 '2015-01-02', '2016-01-04', '2017-01-03',
 '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
'2023-01-03'])].describe())
print("day 7 Santa Return")
print(INDU.loc[INDU['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
 '2015-01-05', '2016-01-05', '2017-01-04',
 '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
'2023-01-04'])].describe())
```

```
day 1 Santa Return
           Close     Return
count  14.000000  14.000000
mean  530.299286   0.000024
std   204.644327   0.009940
min   246.700000  -0.031415
25%   357.987500  -0.000512
50%   500.630000   0.000705
75%   676.665000   0.005078
max   888.530000   0.010497
day 2 Santa Return
           Close     Return
count  14.000000  14.000000
mean  532.873571   0.004421
std   205.711242   0.012848
min   246.400000  -0.003262
25%   357.955000  -0.000902
50%   512.825000   0.001144
75%   677.947500   0.003029
max   893.070000   0.048020
day 3 Santa Return
           Close     Return
count  14.000000  14.000000
mean  531.988571  -0.001390
std   204.608027   0.007635
min   246.880000  -0.014526
25%   357.515000  -0.005392
50%   516.170000  -0.000413
75%   678.160000   0.001870
max   894.530000   0.012447
day 4 Santa Return
           Close     Return
count  14.000000  14.000000
mean  531.928571  -0.000651
std   205.666041   0.006990
min   246.220000  -0.011669
25%   354.617500  -0.004532
50%   514.130000  -0.002216
75%   675.465000   0.001133
max   891.030000   0.012536
day 5 Santa Return
           Close     Return
count  14.000000  14.000000
mean  532.084286  -0.000088
std   206.235156   0.008645
min   242.990000  -0.013118
25%   359.677500  -0.005329
50%   512.270000   0.001301
75%   675.152500   0.004633
max   894.960000   0.018716
day 6 Santa Return
           Close     Return
count  14.000000  14.000000
mean  532.482857   0.000358
std   203.531587   0.014482
min   247.110000  -0.025482
25%   364.042500  -0.006551
50%   513.690000   0.005568
75%   685.700000   0.014614
max   887.590000   0.023605
day 7 Santa Return
           Close     Return
count  14.000000  14.000000
mean  533.576429   0.000602
std   207.455930   0.012750
min   247.990000  -0.029563
25%   364.247500  -0.000591
50%   501.485000   0.003135
75%   685.927500   0.005299
max   905.630000   0.020325
```

SP 500 Consumer Staple sector Index

```
In [ ]: CONS=pd.read_csv('/content/gdrive/MyDrive/S5CONS data.csv')

        CONS['Date'] = pd.to_datetime(CONS['Date'])

        CONS = CONS.iloc[::-1]

        CONS['Return'] = CONS[' Close'].pct_change()
        CONS = CONS.dropna()

        CONS
```

```
<ipython-input-94-4fc5954caa3a>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  CONS['Return'] = CONS[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	250.98	0.017514
3535	2009-01-05	250.37	-0.002430
3534	2009-01-06	247.76	-0.010425
3533	2009-01-07	244.93	-0.011422
3532	2009-01-08	241.86	-0.012534
...	...	...	...
4	2023-01-13	781.20	0.004604
3	2023-01-17	781.17	-0.000038
2	2023-01-18	760.45	-0.026524
1	2023-01-19	752.72	-0.010165
0	2023-01-20	758.85	0.008144

3537 rows × 3 columns

```
In [ ]: CONS.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	497.949403	0.000359
std	156.918751	0.009021
min	199.800000	-0.092353
25%	356.430000	-0.003705
50%	512.690000	0.000476
75%	593.620000	0.004887
max	841.990000	0.084097

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
        print(CONS.loc[CONS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
        '2010-01-04', '2010-01-05',
                '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
        '2011-01-03', '2011-01-04',
                '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
        '2012-01-03', '2012-01-04',
                '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
        '2013-01-02', '2013-01-03',
                '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
        '2014-01-02', '2014-01-03',
                '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
        '2015-01-02', '2015-01-05',
                '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
        '2016-01-04', '2016-01-05',
                '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
        '2017-01-03', '2017-01-04',
                '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
        '2018-01-02', '2018-01-03',
                '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
        '2019-01-02', '2019-01-03',
                '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
        '2020-01-02', '2020-01-03',
                '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
        '2021-01-04', '2021-01-05',
                '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
        '2022-01-03', '2022-01-04',
                '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
        '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   521.385918  -0.000166
std    163.143464   0.007339
min    274.300000  -0.029789
25%    361.342500  -0.003596
50%    519.735000  -0.000257
75%    646.562500   0.002984
max    808.330000   0.028426
```

```
In [ ]: print("2009 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
        '2010-01-04', '2010-01-05'])].describe())

        print("2010 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
        '2011-01-03', '2011-01-04'])].describe())

        print("2011 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
        '2012-01-03', '2012-01-04'])].describe())

        print("2012 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
        '2013-01-02', '2013-01-03'])].describe())

        print("2013 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
        '2014-01-02', '2014-01-03'])].describe())

        print("2014 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
        '2015-01-02', '2015-01-05'])].describe())

        print("2015 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
        '2016-01-04', '2016-01-05'])].describe())

        print("2016 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
        '2017-01-03', '2017-01-04'])].describe())

        print("2017 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
        '2018-01-02', '2018-01-03'])].describe())

        print("2018 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
        '2019-01-02', '2019-01-03'])].describe())

        print("2019 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
        '2020-01-02', '2020-01-03'])].describe())

        print("2020 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
        '2021-01-04', '2021-01-05'])].describe())

        print("2021 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
        '2022-01-03', '2022-01-04'])].describe())

        print("2022 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
        '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   276.787143  0.000291
std      1.145014  0.006312
min    274.300000 -0.011353
25%    276.850000 -0.000938
50%    277.000000  0.001009
75%    277.420000  0.002207
max    277.670000  0.009843
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   303.557143 -0.000731
std      0.361327  0.002392
min    303.000000 -0.004236
25%    303.365000 -0.002269
50%    303.580000 -0.000099
75%    303.735000  0.000989
max    304.120000  0.001779
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   336.072857  0.000454
std      0.980539  0.005631
min    334.970000 -0.005601
25%    335.325000 -0.003596
50%    335.680000 -0.000415
75%    336.890000  0.003670
max    337.430000  0.009044
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   362.924286  0.001956
std      4.991830  0.012750
min    356.830000 -0.009796
25%    360.200000 -0.005875
50%    360.780000 -0.003052
75%    366.090000  0.005979
max    370.280000  0.026332
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   440.110000 -0.000286
std      2.352233  0.005106
min    437.020000 -0.010845
25%    438.165000 -0.001151
50%    440.430000  0.001324
75%    442.080000  0.002721
max    442.830000  0.004378
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   503.354286 -0.004423
std      6.160073  0.004495
min    494.000000 -0.012239
25%    498.705000 -0.005914
50%    505.770000 -0.003610
75%    508.295000 -0.002615
max    509.710000  0.001946
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   519.927143  0.002104
std      5.103984  0.006777
min    511.680000 -0.013001
25%    516.845000 -0.007300
50%    521.580000 -0.001491
75%    523.230000  0.002867
max    526.080000  0.008628
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   533.711429 -0.000229
std      1.422339  0.003765
min    531.790000 -0.006107
25%    532.740000 -0.002228
50%    533.680000  0.000675
75%    534.800000  0.002159
max    535.430000  0.003965
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   586.847143 -0.000595
std      2.039785  0.002628
min    583.830000 -0.005465
25%    585.735000 -0.001268
50%    587.390000 -0.000425
75%    588.210000  0.000827
max    588.820000  0.002605
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   516.105714  0.000118
std      7.279189  0.017734
min    500.590000 -0.029789
25%    515.360000 -0.005745
50%    519.680000 -0.000558
75%    519.935000  0.007119
max    521.880000  0.028426
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   645.662857 -0.001377
std      3.338816  0.004131
min    640.550000 -0.008192
25%    644.090000 -0.003481
50%    646.580000 -0.000433
75%    647.180000  0.000982
max    649.970000  0.003985
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   691.035714  0.000806
std      3.024990  0.006680
min    687.750000 -0.010958
25%    688.725000 -0.001797
50%    690.800000  0.002102
75%    692.465000  0.006017
max    696.320000  0.008055
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   801.340000  0.004179
std      5.023548  0.004532
min    793.220000 -0.003219
25%    798.570000  0.002074
50%    801.540000  0.004698
75%    804.575000  0.006656
max    808.330000  0.010317
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   781.967143 -0.000389
std      4.373529  0.006567
min    777.290000 -0.012577
25%    779.330000 -0.003512
50%    779.620000  0.002882
75%    784.325000  0.004368
max    789.550000  0.005257
```

```
In [ ]: print("day 1 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
        '2014-12-24', '2015-12-24', '2016-12-23',
                '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
        '2022-12-23'])].describe())
        print("day 2 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
        '2014-12-26', '2015-12-28', '2016-12-27',
                '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
        '2022-12-27'])].describe())
        print("day 3 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
        '2014-12-29', '2015-12-29', '2016-12-28',
                '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
        '2022-12-28'])].describe())
        print("day 4 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
        '2014-12-30', '2015-12-30', '2016-12-29',
                '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
        '2022-12-29'])].describe())
        print("day 5 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
        '2014-12-31', '2015-12-31', '2016-12-30',
                '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
        '2022-12-30'])].describe())
        print("day 6 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
        '2015-01-02', '2016-01-04', '2017-01-03',
                '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
        '2023-01-03'])].describe())
        print("day 7 Santa Return")
        print(CONS.loc[CONS['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
        '2015-01-05', '2016-01-05', '2017-01-04',
                '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
        '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   520.450000  -0.000360
std    167.698991   0.009484
min    277.000000  -0.029789
25%    381.900000  -0.001668
50%    515.465000   0.001362
75%    631.705000   0.003784
max    793.220000   0.010317
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   522.657143   0.003639
std    169.253285   0.008107
min    277.390000  -0.008236
25%    380.137500  -0.000302
50%    518.200000   0.001764
75%    632.747500   0.004607
max    798.180000   0.028426
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   522.581429   0.000110
std    168.549298   0.005951
min    277.670000  -0.012577
25%    380.655000  -0.003002
50%    523.080000   0.000410
75%    634.672500   0.003619
max    801.540000   0.010217
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   522.057143  -0.000958
std    168.394797   0.004349
min    277.450000  -0.009596
25%    378.330000  -0.004157
50%    522.000000  -0.001035
75%    631.845000   0.002052
max    798.960000   0.006923
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   521.435714  -0.001349
std    169.386194   0.007349
min    274.300000  -0.012239
25%    381.260000  -0.005367
50%    520.150000  -0.000450
75%    632.075000   0.003466
max    804.600000   0.011070
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   520.270714  -0.001260
std    167.350328   0.010215
min    277.000000  -0.013001
25%    387.165000  -0.007510
50%    515.680000  -0.002932
75%    627.297500   0.001438
max    804.750000   0.026332
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   520.049286  -0.000976
std    168.395186   0.008658
min    276.700000  -0.007693
25%    386.117500  -0.002818
50%    515.585000  -0.001414
75%    626.370000   0.000532
max    808.330000   0.007016
```

SP 500 Energy sector Index

```
In [ ]: ENRS=pd.read_csv('/content/gdrive/MyDrive/S5ENRS data.csv')

        ENRS['Date'] = pd.to_datetime(ENRS['Date'])

        ENRS = ENRS.iloc[::-1]

        ENRS['Return'] = ENRS[' Close'].pct_change()
        ENRS = ENRS.dropna()

        ENRS
```

```
<ipython-input-95-278d2f8c30a8>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  ENRS['Return'] = ENRS[' Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	403.12	0.043406
3535	2009-01-05	408.61	0.013619
3534	2009-01-06	410.65	0.004993
3533	2009-01-07	394.86	-0.038451
3532	2009-01-08	399.44	0.011599
...	...	...	...
4	2023-01-13	690.21	0.001378
3	2023-01-17	691.07	0.001246
2	2023-01-18	678.87	-0.017654
1	2023-01-19	686.38	0.011063
0	2023-01-20	695.32	0.013025

3536 rows × 3 columns

```
In [ ]: ENRS.describe()
```

Out[ ]:

	Close	Return
count	3536.000000	3536.000000
mean	494.664811	0.000327
std	102.526798	0.017893
min	179.940000	-0.200822
25%	429.310000	-0.007903
50%	501.485000	0.000382
75%	562.387500	0.008789
max	737.090000	0.142512

```
In [ ]: #all the Santa Claus Days from 2009 to 2022
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
        '2010-01-04', '2010-01-05',
                '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
        '2011-01-03', '2011-01-04',
                '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
        '2012-01-03', '2012-01-04',
                '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
        '2013-01-02', '2013-01-03',
                '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
        '2014-01-02', '2014-01-03',
                '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
        '2015-01-02', '2015-01-05',
                '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
        '2016-01-04', '2016-01-05',
                '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
        '2017-01-03', '2017-01-04',
                '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
        '2018-01-02', '2018-01-03',
                '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
        '2019-01-02', '2019-01-03',
                '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
        '2020-01-02', '2020-01-03',
                '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
        '2021-01-04', '2021-01-05',
                '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
        '2022-01-03', '2022-01-04',
                '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
        '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   503.211224   0.001930
std     95.742728   0.015070
min    283.930000  -0.040163
25%    437.842500  -0.006208
50%    513.580000   0.000505
75%    558.822500   0.007992
max    675.960000   0.062426
```

```
In [ ]: print("2009 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
        '2010-01-04', '2010-01-05'])].describe())

        print("2010 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
        '2011-01-03', '2011-01-04'])].describe())

        print("2011 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
        '2012-01-03', '2012-01-04'])].describe())

        print("2012 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
        '2013-01-02', '2013-01-03'])].describe())

        print("2013 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
        '2014-01-02', '2014-01-03'])].describe())

        print("2014 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
        '2015-01-02', '2015-01-05'])].describe())

        print("2015 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
        '2016-01-04', '2016-01-05'])].describe())

        print("2016 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
        '2017-01-03', '2017-01-04'])].describe())

        print("2017 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
        '2018-01-02', '2018-01-03'])].describe())

        print("2018 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
        '2019-01-02', '2019-01-03'])].describe())

        print("2019 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
        '2020-01-02', '2020-01-03'])].describe())

        print("2020 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
        '2021-01-04', '2021-01-05'])].describe())

        print("2021 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
        '2022-01-03', '2022-01-04'])].describe())

        print("2022 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
        '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   436.630000  0.004133
std      5.409171  0.012183
min    429.950000 -0.008578
25%    433.575000 -0.003161
50%    435.200000  0.002826
75%    439.255000  0.006394
max    445.600000  0.028213
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   506.080000  0.001834
std      3.773562  0.005791
min    500.160000 -0.006119
25%    504.370000 -0.002020
50%    506.750000  0.001145
75%    507.685000  0.006200
max    511.540000  0.009452
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   525.364286  0.004114
std      7.162018  0.013672
min    515.620000 -0.018782
25%    521.215000 -0.000047
50%    524.470000  0.001945
75%    529.935000  0.009835
max    535.160000  0.026056
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   534.710000  0.001896
std      8.147611  0.014937
min    522.030000 -0.017688
25%    531.795000 -0.005469
50%    532.960000 -0.001372
75%    539.500000  0.009974
max    545.390000  0.023323
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   646.178571  0.000763
std      4.115363  0.008734
min    641.530000 -0.013059
25%    642.740000 -0.005261
50%    645.770000  0.004847
75%    649.400000  0.007470
max    651.670000  0.009136
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   587.701429 -0.007932
std     10.146220  0.014949
min    565.600000 -0.039924
25%    587.855000 -0.007817
50%    591.050000 -0.006238
75%    593.395000  0.000978
max    594.760000  0.004313
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   450.832857 -0.003977
std      4.087651  0.009964
min    446.930000 -0.017921
25%    448.095000 -0.011878
50%    450.010000  0.001539
75%    452.015000  0.004213
max    458.670000  0.006949
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   558.935714 -0.000842
std      3.081514  0.006517
min    554.500000 -0.009771
25%    556.705000 -0.002802
50%    559.300000 -0.002422
75%    561.230000  0.000180
max    562.880000  0.011542
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   538.174286  0.005328
std      6.686705  0.008682
min    532.360000 -0.003940
25%    534.220000 -0.001144
50%    535.520000  0.002165
75%    539.840000  0.011758
max    551.220000  0.017847
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   422.110000  0.004844
std     11.057228  0.031723
min    398.390000 -0.040163
25%    422.710000 -0.009994
50%    424.070000  0.004524
75%    427.020000  0.013553
max    432.850000  0.062426
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   456.870000  0.000476
std      2.297506  0.005203
min    453.390000 -0.004703
25%    455.710000 -0.003431
50%    457.060000 -0.000481
75%    457.460000  0.003440
max    460.340000  0.008500
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   288.248571  0.005168
std      5.151525  0.019603
min    283.930000 -0.008111
25%    285.980000 -0.006453
50%    286.500000 -0.005428
75%    287.930000  0.008642
max    299.490000  0.045340
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   430.098571  0.010890
std     10.287804  0.017885
min    421.680000 -0.006760
25%    423.645000 -0.003733
50%    427.250000  0.002514
75%    431.785000  0.026681
max    450.900000  0.034578
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   663.022857  0.000332
std     11.156869  0.022680
min    647.970000 -0.036247
25%    654.645000 -0.010817
50%    667.270000  0.007598
75%    670.335000  0.010489
max    675.960000  0.031628
```

```
In [ ]: print("day 1 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
        '2014-12-24', '2015-12-24', '2016-12-23',
                '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
        '2022-12-23'])].describe())
        print("day 2 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
        '2014-12-26', '2015-12-28', '2016-12-27',
                '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
        '2022-12-27'])].describe())
        print("day 3 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
        '2014-12-29', '2015-12-29', '2016-12-28',
                '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
        '2022-12-28'])].describe())
        print("day 4 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
        '2014-12-30', '2015-12-30', '2016-12-29',
                '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
        '2022-12-29'])].describe())
        print("day 5 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
        '2014-12-31', '2015-12-31', '2016-12-30',
                '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
        '2022-12-30'])].describe())
        print("day 6 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
        '2015-01-02', '2016-01-04', '2017-01-03',
                '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
        '2023-01-03'])].describe())
        print("day 7 Santa Return")
        print(ENRS.loc[ENRS['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
        '2015-01-05', '2016-01-05', '2017-01-04',
                '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
        '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   501.527857  -0.000100
std    100.928192   0.016420
min    287.380000  -0.040163
25%    440.665000  -0.006982
50%    512.305000  -0.001236
75%    554.707500   0.005977
max    668.330000   0.031628
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   504.067143   0.005242
std    101.395273   0.017947
min    285.820000  -0.017921
25%    439.935000  -0.002080
50%    513.925000   0.002148
75%    556.347500   0.007284
max    675.960000   0.062426
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   502.070714  -0.003620
std     99.952330   0.009915
min    283.930000  -0.022205
25%    438.505000  -0.006723
50%    511.000000  -0.003954
75%    551.792500   0.004297
max    660.950000   0.008002
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   500.897143  -0.002031
std     99.704017   0.009637
min    288.480000  -0.017688
25%    436.985000  -0.007681
50%    514.290000  -0.002936
75%    550.902500   0.001088
max    667.270000   0.016025
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   501.916429   0.001569
std    101.046247   0.008092
min    286.140000  -0.008578
25%    434.572500  -0.003643
50%    513.780000   0.001050
75%    549.227500   0.006259
max    672.340000   0.020937
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   505.767143   0.009381
std     96.341025   0.018176
min    286.500000  -0.036247
25%    443.497500   0.002022
50%    522.960000   0.010497
75%    557.022500   0.022668
max    647.970000   0.030965
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   506.232143   0.003097
std     92.070552   0.020942
min    299.490000  -0.033924
25%    450.232500  -0.003271
50%    521.785000  -0.000210
75%    557.280000   0.007234
max    648.340000   0.045340
```

SP 500 Utility sector Index

In [ ]:
```
UTIL= pd.read_csv('/content/gdrive/MyDrive/S5UTIL data.csv')

UTIL['Date'] = pd.to_datetime(UTIL['Date'])

UTIL = UTIL.iloc[::-1]

UTIL['Return'] = UTIL[' Close'].pct_change()
UTIL = UTIL.dropna()

UTIL
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	151.29	0.022713
3535	2009-01-05	152.38	0.007205
3534	2009-01-06	151.16	-0.008006
3533	2009-01-07	148.64	-0.016671
3532	2009-01-08	149.20	0.003767
...	...	...	...
4	2023-01-13	362.63	-0.004393
3	2023-01-17	362.18	-0.001241
2	2023-01-18	353.46	-0.024076
1	2023-01-19	349.93	-0.009987
0	2023-01-20	351.99	0.005887

3537 rows × 3 columns

In [ ]:
```
UTIL.describe()
```

	Close	Return
count	3537.000000	3537.000000
mean	240.258422	0.000310
std	67.598883	0.011429
min	113.810000	-0.115430
25%	180.320000	-0.005286
50%	235.810000	0.000859
75%	294.220000	0.006189
max	394.810000	0.131115

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(UTIL.loc[UTIL['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05',
  '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04',
  '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04',
  '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03',
  '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03',
  '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05',
  '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05',
  '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04',
  '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03',
  '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03',
  '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03',
  '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05',
  '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04',
  '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   248.167959  -0.000491
std     68.506976   0.009518
min    156.510000  -0.042654
25%    182.792500  -0.004654
50%    246.460000   0.000741
75%    312.282500   0.005033
max    363.710000   0.018125
```

In [ ]:
```
print("2009 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   159.191429 -0.002350
std      1.583113  0.007989
min    156.510000 -0.015209
25%    158.160000 -0.006308
50%    160.260000  0.000686
75%    160.375000  0.001825
max    160.500000  0.007038
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   159.882857  0.001074
std      0.562693  0.003110
min    159.340000 -0.002562
25%    159.500000 -0.001127
50%    159.680000  0.000063
75%    160.110000  0.003625
max    160.940000  0.005546
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   182.122857  0.001760
std      1.998455  0.009566
min    178.880000 -0.017051
25%    181.130000 -0.004250
50%    182.730000  0.005449
75%    183.405000  0.007370
max    184.180000  0.007935
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   178.281429  0.001058
std      2.095586  0.010899
min    175.220000 -0.009889
25%    177.165000 -0.006279
50%    177.660000 -0.002199
75%    179.940000  0.006963
max    180.880000  0.018125
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   191.802857 -0.001708
std      1.341066  0.006725
min    189.680000 -0.015424
25%    191.045000 -0.003496
50%    192.220000  0.001876
75%    192.710000  0.002572
max    193.210000  0.003438
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   243.687143 -0.000777
std      4.020359  0.016184
min    238.350000 -0.020891
25%    240.825000 -0.015759
50%    244.170000  0.005705
75%    245.885000  0.011605
max    249.870000  0.018054
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   221.177143 -0.000095
std      1.171320  0.005945
min    219.410000 -0.010524
25%    220.565000 -0.002082
50%    221.140000 -0.000813
75%    221.945000  0.003477
max    222.670000  0.007885
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   246.768571 -0.000227
std      1.016648  0.007110
min    244.890000 -0.009785
25%    246.460000 -0.003918
50%    246.910000 -0.000081
75%    247.315000  0.001646
max    248.030000  0.012822
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   265.790000 -0.001702
std      1.557145  0.005615
min    263.020000 -0.008715
25%    265.035000 -0.004537
50%    266.110000  0.000000
75%    266.980000  0.002770
max    267.370000  0.004735
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   265.747143 -0.004760
std      2.646486  0.019572
min    261.700000 -0.042654
25%    263.965000 -0.008879
50%    265.790000  0.000796
75%    268.100000  0.005334
max    268.610000  0.015629
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   325.881429 -0.000353
std      1.584744  0.006191
min    323.820000 -0.013826
25%    324.770000  0.000294
50%    325.960000  0.001112
75%    326.745000  0.002241
max    328.360000  0.005173
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   313.065714  0.000857
std      2.906744  0.013023
min    310.760000 -0.026044
25%    311.080000 -0.000905
50%    312.610000  0.004722
75%    313.430000  0.005828
max    319.070000  0.015855
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   360.360000  0.001921
std      2.485283  0.006236
min    356.130000 -0.009403
25%    359.285000  0.000004
50%    360.290000  0.003432
75%    361.910000  0.005043
max    363.710000  0.009322
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   360.592857  0.001949
std      1.800581  0.008586
min    358.480000 -0.009669
25%    359.010000 -0.004779
50%    360.800000  0.006181
75%    361.910000  0.008080
max    363.030000  0.010531
```

In [ ]:
```
print("day 1 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
  '2014-12-24', '2015-12-24', '2016-12-23', '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
  '2022-12-23'])].describe())
print("day 2 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
  '2014-12-26', '2015-12-28', '2016-12-27', '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
  '2022-12-27'])].describe())
print("day 3 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
  '2014-12-29', '2015-12-29', '2016-12-28', '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
  '2022-12-28'])].describe())
print("day 4 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
  '2014-12-30', '2015-12-30', '2016-12-29', '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
  '2022-12-29'])].describe())
print("day 5 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
  '2014-12-31', '2015-12-31', '2016-12-30', '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
  '2022-12-30'])].describe())
print("day 6 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
  '2015-01-02', '2016-01-04', '2017-01-03', '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
  '2023-01-03'])].describe())
print("day 7 Santa Return")
print(UTIL.loc[UTIL['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
  '2015-01-05', '2016-01-05', '2017-01-04', '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
  '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   247.749286   0.000931
std     69.781877   0.013704
min    159.680000  -0.042654
25%    184.362500  -0.003302
50%    245.745000   0.002451
75%    300.120500   0.006917
max    360.800000   0.018054
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   248.687143   0.000160
std     70.443121   0.006846
min    160.060000  -0.009562
25%    185.002500  -0.003644
50%    247.215000   0.002140
75%    301.025000   0.007425
max    363.030000   0.015629
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   248.841429   0.000485
std     70.681287   0.006285
min    159.650000  -0.009785
25%    185.120500  -0.002471
50%    247.180000   0.000682
75%    301.485000   0.004810
max    361.290000   0.011128
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   249.120000   0.000666
std     71.273775   0.008193
min    159.350000  -0.020891
25%    186.327500  -0.001226
50%    246.340000   0.001774
75%    302.590000   0.004735
max    362.530000   0.012822
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   248.639286  -0.001626
std     71.726093   0.009980
min    157.990000  -0.018434
25%    185.537500  -0.008840
50%    243.485000  -0.000031
75%    306.455000   0.003012
max    363.710000   0.015855
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   247.052857  -0.005903
std     70.242100   0.011753
min    158.130000  -0.026044
25%    183.217500  -0.015024
50%    243.800000  -0.005856
75%    299.330000   0.001628
max    360.290000   0.018125
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   246.885714  -0.001150
std     70.701146   0.006670
min    156.510000  -0.013084
25%    183.080000  -0.004898
50%    242.630000   0.000161
75%    299.142500   0.002777
max    361.860000   0.009372
```

SP 500 Financials sector Index

In [ ]:
```
FINL=pd.read_csv('/content/gdrive/MyDrive/S5FINL data.csv')

FINL['Date'] = pd.to_datetime(FINL['Date'])

FINL = FINL.iloc[::-1]

FINL['Return'] = FINL[' Close'].pct_change()
FINL = FINL.dropna()

FINL
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	171.36	0.015226
3535	2009-01-05	167.15	-0.024568
3534	2009-01-06	170.39	0.019384
3533	2009-01-07	161.64	-0.051353
3532	2009-01-08	161.31	-0.002042
...	...	...	...
4	2023-01-13	600.66	0.007092
3	2023-01-17	596.50	-0.006776
2	2023-01-18	585.64	-0.018354
1	2023-01-19	578.61	-0.012004
0	2023-01-20	588.16	0.016505

3537 rows × 3 columns

In [ ]:
```
FINL.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	351.709765	0.000516
std	140.892273	0.018098
min	81.740000	-0.167333
25%	216.660000	-0.006741
50%	324.870000	0.000645
75%	454.010000	0.007974
max	688.950000	0.177419

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(FINL.loc[FINL['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05',
  '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04',
  '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04',
  '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03',
  '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03',
  '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05',
  '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05',
  '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04',
  '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03',
  '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03',
  '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03',
  '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05',
  '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04',
  '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   373.499286   0.001771
std    143.973855   0.010757
min    173.530000  -0.023484
25%    221.150000  -0.003409
50%    354.165000   0.000274
75%    483.792500   0.006374
max    675.260000   0.046679
```

In [ ]:
```
print("2009 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   196.072857  0.005156
std      2.592687  0.010377
min    193.780000 -0.004201
25%    194.425000 -0.003383
50%    195.170000  0.000772
75%    196.780000  0.012796
max    201.150000  0.020694
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   216.347143  0.003723
std      2.178874  0.009604
min    214.320000 -0.003534
25%    214.925000 -0.002644
50%    215.650000  0.000278
75%    217.450000  0.005801
max    219.710000  0.023001
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   176.880000  0.002418
std      2.240461  0.015281
min    173.530000 -0.015935
25%    175.780000 -0.006527
50%    176.340000 -0.005220
75%    178.335000  0.011784
max    180.060000  0.027566
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   222.317143  0.003817
std      3.632849  0.012932
min    218.220000 -0.008136
25%    220.400000 -0.002601
50%    221.120000 -0.001492
75%    224.235000  0.006378
max    227.610000  0.028792
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   294.011429  0.000901
std      0.663059  0.003867
min    293.100000 -0.005463
25%    293.610000 -0.001037
50%    293.910000  0.001600
75%    294.430000  0.002897
max    294.990000  0.006448
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   334.528571 -0.004644
std      4.010933  0.008685
min    326.430000 -0.020935
25%    333.365000 -0.007054
50%    336.640000 -0.001273
75%    337.030000  0.000120
max    337.840000  0.003565
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   321.905714 -0.003775
std      4.568803  0.009917
min    315.140000 -0.020483
25%    318.960000 -0.008470
50%    323.850000 -0.002003
75%    324.590000  0.001250
max    327.250000  0.010499
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   389.877143  0.000814
std      3.091848  0.007451
min    385.630000 -0.010318
25%    387.495000 -0.003043
50%    390.310000  0.001405
75%    392.275000  0.005458
max    393.660000  0.009779
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   465.398571 -0.000430
std      1.318237  0.004259
min    463.660000 -0.006956
25%    464.470000 -0.002752
50%    465.300000 -0.000604
75%    466.350000  0.002354
max    467.190000  0.005349
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   389.531429  0.004088
std      9.176609  0.023756
min    370.490000 -0.023484
25%    388.725000 -0.011307
50%    392.000000  0.007376
75%    393.980000  0.010430
max    398.820000  0.046679
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   511.755714  0.000366
std      2.218226  0.006659
min    509.790000 -0.011023
25%    510.210000 -0.002627
50%    511.390000  0.001001
75%    512.240000  0.004207
max    516.210000  0.009425
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   484.434286  0.001405
std      2.985693  0.008290
min    481.310000 -0.013519
25%    482.940000 -0.001341
50%    483.800000  0.003721
75%    484.810000  0.004536
max    490.430000  0.013243
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   656.087143  0.006284
std      8.837341  0.010464
min    650.040000 -0.002590
25%    651.735000 -0.000982
50%    652.700000  0.000475
75%    655.570000  0.011018
max    675.260000  0.026028
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   569.842857  0.004666
std      5.847945  0.007990
min    563.330000 -0.004189
25%    565.795000 -0.001629
50%    569.740000  0.003756
75%    571.645000  0.010248
max    580.950000  0.015860
```

In [ ]:
```
print("day 1 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
  '2014-12-24', '2015-12-24', '2016-12-23', '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
  '2022-12-23'])].describe())
print("day 2 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
  '2014-12-26', '2015-12-28', '2016-12-27', '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
  '2022-12-27'])].describe())
print("day 3 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
  '2014-12-29', '2015-12-29', '2016-12-28', '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
  '2022-12-28'])].describe())
print("day 4 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
  '2014-12-30', '2015-12-30', '2016-12-29', '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
  '2022-12-29'])].describe())
print("day 5 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
  '2014-12-31', '2015-12-31', '2016-12-30', '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
  '2022-12-30'])].describe())
print("day 6 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
  '2015-01-02', '2016-01-04', '2017-01-03', '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
  '2023-01-03'])].describe())
print("day 7 Santa Return")
print(FINL.loc[FINL['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
  '2015-01-05', '2016-01-05', '2017-01-04', '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
  '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   371.692857   0.001193
std    147.382951   0.008313
min    177.550000  -0.023484
25%    239.260000  -0.001021
50%    353.570000   0.001203
75%    477.622500   0.007113
max    652.700000   0.009590
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   373.067143   0.003111
std    147.938917   0.012886
min    176.340000  -0.006815
25%    239.130000  -0.001815
50%    362.175000   0.000124
75%    479.077500   0.001500
max    653.010000   0.046679
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   372.688571  -0.001543
std    147.892149   0.007037
min    173.530000  -0.015935
25%    238.485000  -0.004025
50%    363.150000  -0.002143
75%    479.907500   0.003519
max    652.580000   0.011065
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   372.864286   0.000258
std    148.490772   0.007424
min    176.330000  -0.008136
25%    237.050000  -0.003799
50%    361.520000  -0.002166
75%    479.812500   0.003164
max    650.890000   0.016136
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   373.053571   0.000420
std    148.585627   0.008016
min    175.230000  -0.012122
25%    239.607500  -0.005604
50%    359.925000   0.000397
75%    483.807500   0.003720
max    650.040000   0.013839
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   374.973571   0.007360
std    148.486920   0.014750
min    180.060000  -0.020483
25%    243.982500  -0.000385
50%    361.860000   0.008466
75%    478.765000   0.018632
max    658.130000   0.028792
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   376.155000   0.001595
std    151.644213   0.013769
min    179.120000  -0.022767
25%    244.170000  -0.004507
50%    358.085000   0.003526
75%    480.735000   0.008049
max    675.260000   0.026028
```

SP 500 Materials sector Index

In [ ]:
```
MATR=pd.read_csv('/content/gdrive/MyDrive/S5MATR data.csv')

MATR['Date'] = pd.to_datetime(MATR['Date'])

MATR = MATR.iloc[::-1]

MATR['Return'] = MATR[' Close'].pct_change()
MATR = MATR.dropna()

MATR
```

Out[ ]:

	Date	Close	Return
3535	2009-01-02	142.94	0.038884
3534	2009-01-05	142.93	-0.000070
3533	2009-01-06	145.61	0.018750
3532	2009-01-07	143.24	-0.016276
3531	2009-01-08	144.43	0.008308
...	...	...	...
4	2023-01-13	528.16	0.006729
3	2023-01-17	522.50	-0.010716
2	2023-01-18	515.28	-0.013818
1	2023-01-19	511.31	-0.007705
0	2023-01-20	521.77	0.020457

3536 rows × 3 columns

In [ ]:
```
MATR.describe()
```

Out[ ]:

	Close	Return
count	3536.000000	3536.000000
mean	316.632831	0.000480
std	103.277694	0.014298
min	108.330000	-0.114382
25%	237.702500	-0.006466
50%	305.535000	0.000760
75%	367.745000	0.007846
max	569.630000	0.116318

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(MATR.loc[MATR['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05',
                                  '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04',
                                  '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04',
                                  '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03',
                                  '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03',
                                  '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05',
                                  '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05',
                                  '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04',
                                  '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03',
                                  '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03',
                                  '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03',
                                  '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05',
                                  '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04',
                                  '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   333.400510   0.001416
std    105.763821   0.011601
min    199.810000  -0.027637
25%    240.310000  -0.003898
50%    309.120000   0.001225
75%    384.597500   0.006746
max    569.630000   0.046193
```

In [ ]:
```
print("2009 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04'])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   202.927143  0.004265
std      2.235484  0.012217
min    199.810000 -0.012504
25%    202.075000 -0.000147
50%    202.340000  0.001831
75%    203.880000  0.006521
max    206.430000  0.027776
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   239.478571  0.001203
std      1.051006  0.003855
min    237.930000 -0.005305
25%    239.020000 -0.000314
50%    239.510000  0.000794
75%    239.800000  0.003315
max    241.270000  0.006928
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   214.111429  0.004744
std      3.511084  0.015622
min    209.480000 -0.022446
25%    211.745000 -0.002210
50%    214.290000  0.006011
75%    216.130000  0.010295
max    219.260000  0.029474
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   237.662857  0.004411
std      3.573531  0.013606
min    232.930000 -0.012799
25%    235.705000 -0.005460
50%    236.920000  0.004737
75%    239.585000  0.013168
max    243.210000  0.023525
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   290.074286  0.001816
std      1.117749  0.005651
min    288.490000 -0.007132
25%    289.295000 -0.000743
50%    290.120000  0.002309
75%    290.840000  0.004114
max    291.640000  0.010791
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   306.337143 -0.005525
std      4.169911  0.010274
min    297.640000 -0.026748
25%    305.550000 -0.006448
50%    308.370000 -0.002164
75%    308.800000 -0.000103
max    309.650000  0.003337
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   274.377143 -0.005095
std      4.009837  0.008246
min    269.010000 -0.016701
25%    271.355000 -0.009065
50%    275.780000 -0.007582
75%    277.235000 -0.001134
max    278.670000  0.009016
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   315.431429  0.001363
std      2.238902  0.008268
min    312.160000 -0.010137
25%    314.400000 -0.003625
50%    316.490000  0.001362
75%    316.925000  0.005848
max    318.720000  0.013869
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   380.930000  0.003917
std      3.654413  0.005981
min    378.160000 -0.003183
25%    378.570000  0.000291
50%    378.940000  0.003686
75%    382.390000  0.005659
max    387.490000  0.015016
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   311.557143  0.002424
std      7.363271  0.025897
min    296.580000 -0.027637
25%    309.770000 -0.016299
50%    314.000000  0.004516
75%    316.315000  0.013245
max    318.050000  0.046193
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   382.665714 -0.003267
std      3.790975  0.008551
min    374.880000 -0.016244
25%    382.020000 -0.008184
50%    383.910000 -0.002452
75%    384.990000  0.002384
max    385.850000  0.007520
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   452.744286  0.004317
std      4.699372  0.011182
min    447.880000 -0.010248
25%    449.640000 -0.002857
50%    451.040000  0.004032
75%    454.795000  0.009567
max    461.420000  0.023013
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   566.681429  0.003561
std      3.008108  0.009754
min    561.820000 -0.013711
25%    565.045000  0.000317
50%    566.980000  0.004674
75%    569.105000  0.009301
max    569.630000  0.014730
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   492.628571  0.001696
std      3.724994  0.010984
min    488.120000 -0.014954
25%    489.295000 -0.004251
50%    493.230000  0.000303
75%    495.455000  0.008813
max    497.550000  0.017401
```

In [ ]:
```
print("day 1 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
  '2014-12-24', '2015-12-24', '2016-12-23',
                                  '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
  '2022-12-23'])].describe())
print("day 2 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
  '2014-12-26', '2015-12-28', '2016-12-27',
                                  '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
  '2022-12-27'])].describe())
print("day 3 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
  '2014-12-29', '2015-12-29', '2016-12-28',
                                  '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
  '2022-12-28'])].describe())
print("day 4 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
  '2014-12-30', '2015-12-30', '2016-12-29',
                                  '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
  '2022-12-29'])].describe())
print("day 5 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
  '2014-12-31', '2015-12-31', '2016-12-30',
                                  '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
  '2022-12-30'])].describe())
print("day 6 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
  '2015-01-02', '2016-01-04', '2017-01-03',
                                  '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
  '2023-01-03'])].describe())
print("day 7 Santa Return")
print(MATR.loc[MATR['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
  '2015-01-05', '2016-01-05', '2017-01-04',
                                  '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
  '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   332.114286   0.002471
std    109.161133   0.009773
min    202.030000  -0.026553
25%    248.020000  -0.000020
50%    302.600000   0.004211
75%    382.547500   0.007663
max    563.500000   0.014730
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   333.625000   0.004903
std    109.141754   0.012499
min    202.400000  -0.007582
25%    248.010000   0.000056
50%    309.965000   0.005328
75%    383.655000   0.008293
max    566.630000   0.046193
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   333.156429  -0.001475
std    108.914892   0.009984
min    202.120000  -0.022446
25%    249.300000  -0.003706
50%    311.710000  -0.001750
75%    383.045000   0.003375
max    569.060000   0.018467
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   333.379286   0.000080
std    109.769608   0.007681
min    202.340000  -0.012799
25%    248.510000  -0.003898
50%    311.235000  -0.000108
75%    382.265000   0.003184
max    566.980000   0.013396
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   333.412143  -0.000665
std    110.047464   0.008812
min    199.810000  -0.012504
25%    248.117500  -0.007448
50%    308.720000   0.000232
75%    384.122500   0.004513
max    569.630000   0.020135
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   333.732143   0.003916
std    107.022027   0.015450
min    205.360000  -0.016701
25%    249.675000  -0.004969
50%    310.090000   0.003163
75%    383.740000   0.013024
max    561.820000   0.029474
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   334.384286   0.000084
std    110.261270   0.015526
min    206.430000  -0.027637
25%    248.615000  -0.006445
50%    305.430000   0.002494
75%    384.337500   0.011644
max    569.150000   0.023013
```

SP 500 Real Estate sector Index

In [ ]:
```
RLST=pd.read_csv('/content/gdrive/MyDrive/S5RLST data.csv')

RLST['Date'] = pd.to_datetime(RLST['Date'])

RLST = RLST.iloc[::-1]

RLST['Return'] = RLST['Close'].pct_change()
RLST = RLST.dropna()

RLST
```

```
<ipython-input-119-4958ef855f0>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  RLST['Return'] = RLST['Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	76.03	-0.024881
3535	2009-01-05	74.25	-0.023412
3534	2009-01-06	78.55	0.057912
3533	2009-01-07	75.13	-0.043539
3532	2009-01-08	74.48	-0.008652
...	...	...	...
4	2023-01-13	246.60	-0.000077
3	2023-01-17	246.80	0.000805
2	2023-01-18	244.92	-0.015595
1	2023-01-19	243.82	-0.004491
0	2023-01-20	246.74	0.011976

3537 rows × 3 columns

In [ ]:
```
RLST.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	161.608278	0.000480
std	57.203841	0.017561
min	42.950000	-0.165490
25%	145.200000	-0.006021
50%	168.500000	0.000909
75%	217.370000	0.007142
max	324.750000	0.176307

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(RLST.loc[RLST['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05',
                                  '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04',
                                  '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04',
                                  '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03',
                                  '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03',
                                  '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05',
                                  '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05',
                                  '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04',
                                  '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03',
                                  '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03',
                                  '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03',
                                  '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05',
                                  '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04',
                                  '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   187.809592   0.000909
std     55.937461   0.011087
min     93.790000  -0.037235
25%    149.167500  -0.004062
50%    190.635000   0.002270
75%    224.160000   0.006089
max    324.750000   0.032580
```

In [ ]:
```
print("2009 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
  '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
  '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
  '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
  '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
  '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
  '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
  '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
  '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
  '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
  '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
  '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
  '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
  '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
  '2023-01-03', '2023-01-04'])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean    95.778571 -0.003125
std      1.742980  0.012717
min     93.790000 -0.024041
25%     94.110000 -0.009072
50%     96.460000  0.000415
75%     97.075000  0.002254
max     97.830000  0.015389
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   121.058571  0.002341
std      0.954086  0.013052
min    120.450000 -0.019808
25%    120.580000 -0.001654
50%    120.740000  0.001079
75%    120.940000  0.008432
max    123.180000  0.021562
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   130.284286 -0.001266
std      0.891419  0.010548
min    128.750000 -0.016950
25%    129.820000 -0.009074
50%    130.610000  0.005053
75%    130.860000  0.005728
max    131.270000  0.009730
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   151.305714  0.001899
std      1.421441  0.009070
min    149.330000 -0.009025
25%    150.470000 -0.005134
50%    151.260000  0.002915
75%    152.130000  0.007926
max    153.350000  0.013817
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   149.127143  0.000264
std      0.351507  0.003452
min    148.470000 -0.004212
25%    149.040000 -0.002348
50%    149.130000  0.000805
75%    149.315000  0.002246
max    149.580000  0.005456
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   190.345714 -0.000204
std      1.138637  0.009021
min    187.890000 -0.015406
25%    190.355000 -0.003974
50%    190.760000  0.001942
75%    190.855000  0.003019
max    191.350000  0.013944
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   190.812857  0.001207
std      1.592469  0.011267
min    187.930000 -0.012039
25%    190.170000 -0.006893
50%    191.030000 -0.000473
75%    191.760000  0.007209
max    192.870000  0.020327
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   189.511429  0.004106
std      2.171416  0.006965
min    186.900000 -0.008646
25%    188.280000  0.001649
50%    188.560000  0.003943
75%    190.605000  0.008869
max    193.350000  0.012410
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   202.874286  0.002161
std      0.935109  0.004465
min    201.310000 -0.005886
25%    202.470000  0.000553
50%    202.870000  0.004004
75%    203.475000  0.004773
max    204.050000  0.007356
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   190.032857 -0.002525
std      2.677510  0.022207
min    185.390000 -0.037235
25%    188.435000 -0.011255
50%    191.430000  0.002189
75%    192.090000  0.003649
max    192.360000  0.032580
2019 Santa Return
            Close    Return
count    7.000000  7.000000
mean   238.528571  0.001507
std      1.173349  0.007206
min    236.990000 -0.013232
25%    237.710000  0.000197
50%    238.800000  0.003843
75%    239.085000  0.005904
max    240.320000  0.008096
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   223.935714 -0.001083
std      2.796545  0.015504
min    220.220000 -0.032909
25%    222.160000 -0.003929
50%    224.240000  0.003568
75%    225.435000  0.008453
max    227.900000  0.012709
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   322.080000  0.003289
std      1.951444  0.009346
min    319.600000 -0.009607
25%    320.685000 -0.001033
50%    321.630000  0.003560
75%    323.605000  0.005352
max    324.750000  0.020434
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   233.658571  0.004155
std      2.617024  0.014783
min    229.750000 -0.015934
25%    232.730000 -0.005691
50%    233.470000  0.003099
75%    236.255000  0.015217
max    236.420000  0.022867
```

In [ ]:
```
print("day 1 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
  '2014-12-24', '2015-12-24', '2016-12-23',
                                  '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
  '2022-12-23'])].describe())
print("day 2 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
  '2014-12-26', '2015-12-28', '2016-12-27',
                                  '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
  '2022-12-27'])].describe())
print("day 3 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
  '2014-12-29', '2015-12-29', '2016-12-28',
                                  '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
  '2022-12-28'])].describe())
print("day 4 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
  '2014-12-30', '2015-12-30', '2016-12-29',
                                  '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
  '2022-12-29'])].describe())
print("day 5 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
  '2014-12-31', '2015-12-31', '2016-12-30',
                                  '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
  '2022-12-30'])].describe())
print("day 6 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
  '2015-01-02', '2016-01-04', '2017-01-03',
                                  '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
  '2023-01-03'])].describe())
print("day 7 Santa Return")
print(RLST.loc[RLST['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
  '2015-01-05', '2016-01-05', '2017-01-04',
                                  '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
  '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   187.040000   0.003015
std     56.948000   0.013491
min     97.650000  -0.037235
25%    149.687500   0.000680
50%    189.075000   0.004036
75%    218.267500   0.008728
max    319.600000   0.020434
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   187.990000   0.004768
std     57.347627   0.008831
min     97.830000  -0.007334
25%    149.575000   0.001567
50%    190.895000   0.003615
75%    219.942500   0.004959
max    320.970000   0.032580
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   187.783571  -0.001816
std     57.764492   0.008373
min     96.460000  -0.015934
25%    149.520000  -0.008245
50%    191.615000  -0.002640
75%    218.952500   0.003442
max    323.030000   0.009632
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   188.378571   0.002734
std     58.243341   0.007444
min     96.500000  -0.009025
25%    149.292500  -0.003118
50%    191.300000   0.002603
75%    219.967500   0.004437
max    324.180000   0.021589
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   188.215714  -0.001925
std     58.735040   0.010472
min     94.180000  -0.024041
25%    149.527500  -0.007209
50%    190.225000  -0.001789
75%    221.890000   0.005213
max    324.750000   0.012924
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   187.290714  -0.002942
std     57.291739   0.014864
min     93.790000  -0.032909
25%    149.690000  -0.011431
50%    189.240000  -0.003607
75%    215.965000   0.005751
max    321.630000   0.021562
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   187.968571   0.002529
std     57.901960   0.011883
min     94.040000  -0.019808
25%    150.185000  -0.002630
50%    191.105000   0.002304
75%    215.882500   0.007434
max    320.400000   0.022867
```

SP 500 Communication Services sector Index

In [ ]:
```
TELS=pd.read_csv('/content/gdrive/MyDrive/S5TELS data.csv')

TELS['Date'] = pd.to_datetime(TELS['Date'])

TELS = TELS.iloc[::-1]

TELS['Return'] = TELS['Close'].pct_change()
TELS = TELS.dropna()

TELS
```

```
<ipython-input-124-baadd29eaef2>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexin
g.html#returning-a-view-versus-a-copy
  TELS['Return'] = TELS['Close'].pct_change()
```

Out[ ]:

	Date	Close	Return
3536	2009-01-02	114.93	0.028917
3535	2009-01-05	110.44	-0.039067
3534	2009-01-06	109.96	-0.004346
3533	2009-01-07	107.27	-0.024463
3532	2009-01-08	108.33	0.009882
...	...	...	...
4	2023-01-13	171.98	0.005437
3	2023-01-17	170.40	-0.009187
2	2023-01-18	168.82	-0.009272
1	2023-01-19	170.34	0.009004
0	2023-01-20	177.09	0.039627

3537 rows × 3 columns

In [ ]:
```
TELS.describe()
```

Out[ ]:

	Close	Return
count	3537.000000	3537.000000
mean	159.964874	0.000208
std	38.903362	0.012416
min	88.100000	-0.104435
25%	141.140000	-0.005763
50%	156.110000	0.000593
75%	169.450000	0.006639
max	288.460000	0.092011

In [ ]:
```
#all the Santa Claus Days from 2009 to 2022
print(TELS.loc[TELS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05',
                                  '2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04',
                                  '2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04',
                                  '2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03',
                                  '2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03',
                                  '2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05',
                                  '2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05',
                                  '2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04',
                                  '2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03',
                                  '2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03',
                                  '2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03',
                                  '2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05',
                                  '2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04',
                                  '2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
            Close     Return
count   98.000000  98.000000
mean   163.929592   0.001301
std     38.953387   0.010433
min    114.640000  -0.021748
25%    138.522500  -0.003978
50%    154.860000   0.000698
75%    177.452500   0.005281
max    272.060000   0.053951
```

In [ ]:
```
print("2009 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-24', '2009-12-28', '2009-12-29', '2009-12-30', '2009-12-31',
 '2010-01-04', '2010-01-05'])].describe())

print("2010 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2010-12-27', '2010-12-28', '2010-12-29', '2010-12-30', '2010-12-31',
 '2011-01-03', '2011-01-04'])].describe())

print("2011 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2011-12-23', '2011-12-27', '2011-12-28', '2011-12-29', '2011-12-30',
 '2012-01-03', '2012-01-04'])].describe())

print("2012 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2012-12-24', '2012-12-26', '2012-12-27', '2012-12-28', '2012-12-31',
 '2013-01-02', '2013-01-03'])].describe())

print("2013 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2013-12-24', '2013-12-26', '2013-12-27', '2013-12-30', '2013-12-31',
 '2014-01-02', '2014-01-03'])].describe())

print("2014 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2014-12-24', '2014-12-26', '2014-12-29', '2014-12-30', '2014-12-31',
 '2015-01-02', '2015-01-05'])].describe())

print("2015 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2015-12-24', '2015-12-28', '2015-12-29', '2015-12-30', '2015-12-31',
 '2016-01-04', '2016-01-05'])].describe())

print("2016 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2016-12-23', '2016-12-27', '2016-12-28', '2016-12-29', '2016-12-30',
 '2017-01-03', '2017-01-04'])].describe())

print("2017 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2017-12-22', '2017-12-26', '2017-12-27', '2017-12-28', '2017-12-29',
 '2018-01-02', '2018-01-03'])].describe())

print("2018 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2018-12-24', '2018-12-26', '2018-12-27', '2018-12-28', '2018-12-31',
 '2019-01-02', '2019-01-03'])].describe())

print("2019 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2019-12-24', '2019-12-26', '2019-12-27', '2019-12-30', '2019-12-31',
 '2020-01-02', '2020-01-03'])].describe())

print("2020 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2020-12-24', '2020-12-28', '2020-12-29', '2020-12-30', '2020-12-31',
 '2021-01-04', '2021-01-05'])].describe())

print("2021 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2021-12-27', '2021-12-28', '2021-12-29', '2021-12-30', '2021-12-31',
 '2022-01-03', '2022-01-04'])].describe())

print("2022 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2022-12-23', '2022-12-27', '2022-12-28', '2022-12-29', '2022-12-30',
 '2023-01-03', '2023-01-04',])].describe())
```

```
2009 Santa Return
            Close    Return
count    7.000000  7.000000
mean   115.781429  0.002262
std      0.676891  0.007637
min    114.640000 -0.009761
25%    115.510000 -0.000561
50%    115.850000  0.001890
75%    116.160000  0.004649
max    116.640000  0.015527
2010 Santa Return
            Close    Return
count    7.000000  7.000000
mean   129.107143  0.004260
std      1.398007  0.005125
min    128.120000 -0.000468
25%    128.210000  0.000819
50%    128.330000  0.002895
75%    129.610000  0.006119
max    131.660000  0.013516
2011 Santa Return
            Close    Return
count    7.000000  7.000000
mean   129.310000  0.001698
std      0.516624  0.006273
min    128.460000 -0.006727
25%    129.040000 -0.002425
50%    129.330000  0.001929
75%    129.695000  0.006027
max    129.910000  0.009477
2012 Santa Return
            Close    Return
count    7.000000  7.000000
mean   147.100000  0.004157
std      2.399521  0.013771
min    144.400000 -0.010552
25%    145.990000 -0.001979
50%    146.150000 -0.000274
75%    148.245000  0.006055
max    150.680000  0.031772
2013 Santa Return
            Close    Return
count    7.000000  7.000000
mean   155.041429 -0.000081
std      0.774283  0.005221
min    153.550000 -0.006920
25%    154.720000 -0.003279
50%    155.520000  0.000000
75%    155.570000  0.002647
max    155.640000  0.007615
2014 Santa Return
            Close    Return
count    7.000000  7.000000
mean   153.972857 -0.002965
std      1.437529  0.006834
min    151.800000 -0.012302
25%    152.950000 -0.007173
50%    154.450000 -0.003870
75%    154.975000  0.002260
max    155.710000  0.005244
2015 Santa Return
            Close    Return
count    7.000000  7.000000
mean   150.940000 -0.001241
std      1.148825  0.007491
min    149.150000 -0.009841
25%    150.260000 -0.006499
50%    151.340000 -0.004014
75%    151.480000  0.004191
max    152.610000  0.009789
2016 Santa Return
            Close    Return
count    7.000000  7.000000
mean   177.885714  0.001663
std      1.302880  0.008225
min    176.610000 -0.004902
25%    177.065000 -0.003192
50%    177.480000 -0.001126
75%    178.505000  0.002516
max    179.970000  0.019025
2017 Santa Return
            Close    Return
count    7.000000  7.000000
mean   166.221429 -0.003106
std      1.570514  0.009419
min    162.830000 -0.021748
25%    166.260000 -0.005672
50%    166.730000  0.001862
75%    166.940000  0.002163
max    167.590000  0.005158
2018 Santa Return
            Close    Return
count    7.000000  7.000000
mean   137.657143  0.005396
std      3.107168  0.024262
min    130.860000 -0.020436
25%    138.155000 -0.008196
50%    138.480000  0.002818
75%    138.715000  0.008915
max    140.520000  0.053951
2019 Santa Return
           Close    Return
count    7.00000  7.000000
mean   182.64000  0.000677
std      1.02367  0.007957
min    181.28000 -0.010264
25%    181.79000 -0.003480
50%    183.01000 -0.001317
75%    183.29000  0.005060
max    184.03000  0.013158
2020 Santa Return
            Close    Return
count    7.000000  7.000000
mean   220.047143  0.001237
std      1.672779  0.010969
min    217.700000 -0.015050
25%    218.875000 -0.004425
50%    219.790000  0.001564
75%    221.585000  0.006195
max    221.920000  0.018604
2021 Santa Return
            Close    Return
count    7.000000  7.000000
mean   269.868571 -0.000792
std      1.714589  0.006902
min    267.480000 -0.012114
25%    268.525000 -0.003184
50%    270.450000 -0.002867
75%    271.220000  0.003358
max    272.060000  0.009087
2022 Santa Return
            Close    Return
count    7.000000  7.000000
mean   159.441429  0.005054
std      2.612492  0.014943
min    155.240000 -0.015100
25%    158.495000 -0.006019
50%    159.410000  0.010773
75%    160.545000  0.012442
max    163.340000  0.026862
```

In [ ]:
```
print("day 1 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-24', '2010-12-27', '2011-12-23', '2012-12-24', '2013-12-24',
 '2014-12-24', '2015-12-24', '2016-12-23',
                                  '2017-12-22', '2018-12-24', '2019-12-24', '2020-12-24', '2021-12-27',
 '2022-12-23'])].describe())
print("day 2 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-28', '2010-12-28', '2011-12-27', '2012-12-26', '2013-12-26',
 '2014-12-26', '2015-12-28', '2016-12-27',
                                  '2017-12-26', '2018-12-26', '2019-12-26', '2020-12-28', '2021-12-28',
 '2022-12-27'])].describe())
print("day 3 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-29', '2010-12-29', '2011-12-28', '2012-12-27', '2013-12-27',
 '2014-12-29', '2015-12-29', '2016-12-28',
                                  '2017-12-27', '2018-12-27', '2019-12-27', '2020-12-29', '2021-12-29',
 '2022-12-28'])].describe())
print("day 4 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-30', '2010-12-30', '2011-12-29', '2012-12-28', '2013-12-30',
 '2014-12-30', '2015-12-30', '2016-12-29',
                                  '2017-12-28', '2018-12-28', '2019-12-30', '2020-12-30', '2021-12-30',
 '2022-12-29'])].describe())
print("day 5 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2009-12-31', '2010-12-31', '2011-12-30', '2012-12-31', '2013-12-31',
 '2014-12-31', '2015-12-31', '2016-12-30',
                                  '2017-12-29', '2018-12-31', '2019-12-31', '2020-12-31', '2021-12-31',
 '2022-12-30'])].describe())
print("day 6 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2010-01-04', '2011-01-03', '2012-01-03', '2013-01-02', '2014-01-02',
 '2015-01-02', '2016-01-04', '2017-01-03',
                                  '2018-01-02', '2019-01-02', '2020-01-02', '2021-01-04', '2022-01-03',
 '2023-01-03'])].describe())
print("day 7 Santa Return")
print(TELS.loc[TELS['Date'].isin(['2010-01-05', '2011-01-04', '2012-01-04', '2013-01-03', '2014-01-03',
 '2015-01-05', '2016-01-05', '2017-01-04',
                                  '2018-01-03', '2019-01-03', '2020-01-03', '2021-01-05', '2022-01-04',
 '2023-01-04'])].describe())
```

```
day 1 Santa Return
            Close     Return
count   14.000000  14.000000
mean   163.283571   0.001583
std     40.877434   0.007728
min    115.250000  -0.020436
25%    134.692500  -0.000344
50%    154.860000   0.001713
75%    174.870000   0.006625
max    272.060000   0.010773
day 2 Santa Return
            Close     Return
count   14.000000  14.000000
mean   164.200714   0.004199
std     40.711075   0.015277
min    115.900000  -0.011787
25%    139.977500  -0.000419
50%    155.640000   0.002726
75%    174.805000   0.005537
max    271.280000   0.053951
day 3 Santa Return
            Close     Return
count   14.000000  14.000000
mean   163.866429  -0.001890
std     40.527768   0.005196
min    115.850000  -0.015100
25%    140.472500  -0.003344
50%    155.145000  -0.001463
75%    174.252500  -0.000108
max    270.450000   0.006928
day 4 Santa Return
            Close     Return
count   14.000000  14.000000
mean   163.875714   0.000321
std     40.352353   0.009576
min    115.770000  -0.010552
25%    139.892500  -0.004489
50%    155.045000  -0.000120
75%    175.007500   0.003342
max    270.760000   0.026862
day 5 Santa Return
            Close     Return
count   14.000000  14.000000
mean   163.508429  -0.002002
std     39.964821   0.007794
min    114.640000  -0.012302
25%    140.595000  -0.009588
50%    154.035000  -0.000511
75%    173.975000   0.002610
max    267.480000   0.011357
day 6 Santa Return
            Close     Return
count   14.000000  14.000000
mean   164.622857   0.007668
std     39.575182   0.011917
min    116.420000  -0.015050
25%    142.677500   0.001592
50%    153.885000   0.009054
75%    174.590000   0.013826
max    268.970000   0.031772
day 7 Santa Return
            Close     Return
count   14.000000  14.000000
mean   164.151429  -0.003770
std     39.471979   0.009291
min    116.640000  -0.021748
25%    141.435000  -0.006576
50%    152.675000  -0.003127
75%    175.420000   0.002497
max    268.080000   0.010954
```