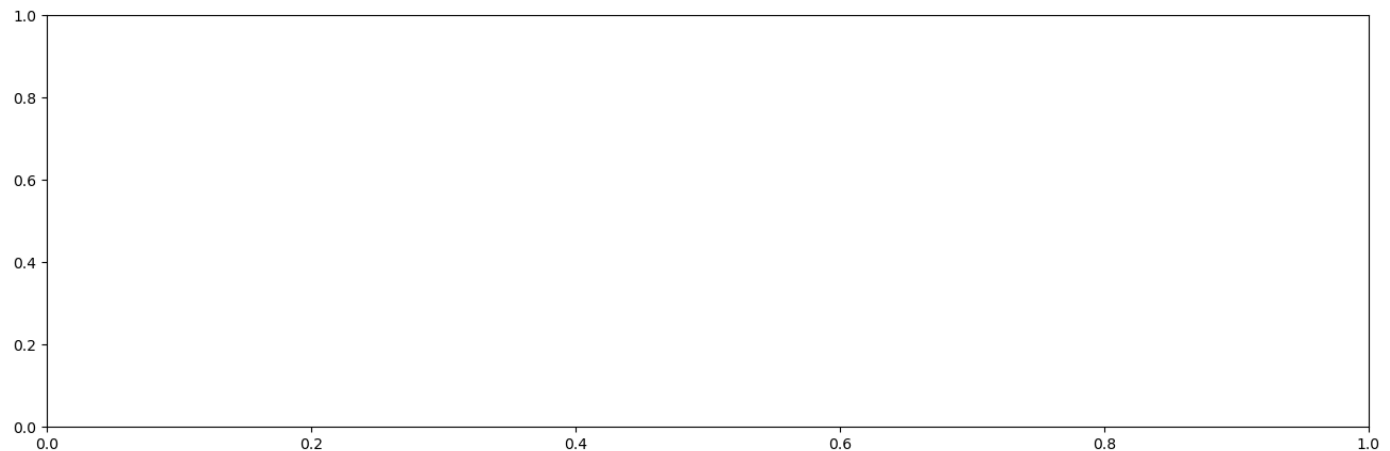


```
In [1]: import random
import matplotlib.pyplot as plt
import numpy as np
```

```
In [49]: fig, ax = plt.subplots(1,1,figsize=(16,5))
```



1-Generar una serie de tiempo con valores aleatorios y graficarla

```
In [2]: time_series = [0, ]
```

```
In [3]: for _ in range(500):
        time_series.append(time_series[-1] + 1 * (2*random.random()-1))
```

```
In [4]: time_series
```

```
Out[4]: [0,
0.6334088829420965,
0.7813154734518013,
-0.06421336186092264,
0.04273686404971855,
0.12993118442116192,
0.21922186739099936,
1.0423568190217667,
1.956452514485906,
2.0529341591728834,
1.8771116287462746,
1.3328721135342358,
0.5252969353605654,
-0.3541966266052181,
-0.41854594537991807,
0.15985957213196045,
0.21904511986334896,
0.8531750171829853,
0.2918679021844568,
0.6453624612041224,
0.7439405175639846,
-0.13332269350465054,
-0.2392716934901049,
-0.29265001881751385,
-0.17838967726436916,
-0.3186124561644508,
-0.566499438109554,
-0.550426342659835,
```

-0.3110571427164499,
-0.8193116227088428,
-0.7382240199318859,
-1.6209486143291019,
-1.2273262448078546,
-1.3983486870559019,
-0.8246472462544638,
-1.4413307249997835,
-1.2641923105139503,
-1.1690286851045772,
-0.4064394908978135,
-1.1596269890091402,
-2.1530796144802453,
-2.621399465961666,
-2.4231568397587324,
-2.176416726456906,
-3.1338952977090395,
-3.3145359450267424,
-3.908800909935668,
-3.0598520135216827,
-2.5373709078794375,
-3.461388503328319,
-4.20766507418246,
-4.835674943755079,
-4.843201111530965,
-3.969911614225757,
-4.857932045154933,
-3.9886832262209904,
-3.28527716065131,
-3.4663026123651806,
-3.6270239425585116,
-4.214881158092277,
-3.2839933924195015,
-2.840055297798354,
-2.361510573306872,
-3.29305631196285,
-2.98824078091104,
-2.845637325019603,
-3.5230713725258025,
-3.5005181130786633,
-4.037508487472287,
-4.556645531613964,
-5.161647008781035,
-4.747754789754861,
-5.256444471996471,
-5.753899171828397,
-6.107794039613326,
-5.954545713209922,
-5.9407312694282,
-5.3850754826919145,
-5.677538469340181,
-4.796012663741309,
-5.042300051609452,
-5.804445185026815,
-5.139285764031407,
-5.775315769480326,
-5.944924075174065,
-6.498799527625091,
-6.378013660996769,
-6.069420207550223,
-5.669148223765733,
-5.865577476720483,
-5.6708477945086475,
-5.096329081058263,
-4.252074370495502,
-3.258313203128598,

-2.4241151364264457,
-2.266589003026642,
-3.2224661482429973,
-3.4329872007447015,
-2.5990920458844333,
-3.119758877879433,
-3.2265006618871057,
-4.034621575883376,
-4.60399042159864,
-4.907938263511236,
-5.18928067127028,
-4.364529646524874,
-3.9534806519241856,
-3.1713836959075246,
-2.498378455892592,
-2.6857549680454875,
-2.9500913503842114,
-3.1700828129484218,
-2.304551357492115,
-3.0156715357406068,
-3.662642543949334,
-4.614968776391009,
-5.244726695152716,
-5.504550873697009,
-5.017097115425444,
-5.067451239048346,
-4.271610458669292,
-3.281793767432597,
-2.532574678951872,
-2.695086005594848,
-2.0612503432388283,
-2.3023104062851276,
-3.1059471926067674,
-4.09395704377513,
-3.8320391757874788,
-4.243357238136731,
-4.781165880825238,
-5.097078516022032,
-5.737566343111079,
-5.462098318042104,
-5.108625531950813,
-5.3576025371129665,
-5.196901425782151,
-4.24717076334852,
-4.960246995913791,
-4.112789990077945,
-4.138309530540043,
-3.767713978360674,
-4.190662383457644,
-4.4780804813918245,
-5.349848442544215,
-5.866479210398434,
-6.077861366753081,
-5.193390946715552,
-4.887346876212488,
-5.264435655011344,
-5.946604301264152,
-5.182600398745549,
-5.670987278079708,
-5.398760817817234,
-5.21258513537222,
-4.273908808474186,
-3.85181456550097,
-4.818790807751324,
-4.868116976407901,
-4.798419956658638,

-4.5042941431878525,
-5.341260881056061,
-6.100114297302388,
-5.7964617606005815,
-4.9297207779748415,
-5.602249615980212,
-6.290414596195111,
-6.452654127987484,
-5.774119424340299,
-5.990492735133143,
-5.404209607690358,
-6.245686092439104,
-5.900637856607209,
-6.762425021194852,
-6.075536291850132,
-6.4428770316354935,
-5.862877645174356,
-6.09763499198614,
-6.252424179431383,
-6.901557247866095,
-6.781639392719571,
-6.870073950160055,
-6.801534348478942,
-6.585952023076597,
-7.089783686989806,
-6.551895652442429,
-7.286410981369413,
-6.905762766400059,
-6.818769424471796,
-7.007377075952885,
-7.247862650366098,
-6.315921602801046,
-6.315688713666689,
-6.52668134710805,
-6.679571454715339,
-6.008506545968534,
-5.173808876053818,
-4.725389923176387,
-3.887298849602984,
-4.6621171509346775,
-4.537587918901933,
-5.2142707259458945,
-6.059729918927227,
-5.323061472410469,
-6.2034909365209465,
-5.78543079436489,
-4.878398077839467,
-4.13958215504076,
-3.7597312697929723,
-3.8969508114889497,
-4.850376325833215,
-5.266692929619831,
-4.422711705285883,
-4.107119969072389,
-4.052517965273945,
-4.28815591930578,
-4.624701526072869,
-5.238107274470552,
-5.484274206833147,
-5.2682767881701364,
-5.2472949973847705,
-6.1257415695843935,
-5.951512707656182,
-6.330930694736928,
-6.749437931343521,
-7.212579796894441,

-7.764715084990456,
-8.526859026160247,
-8.59334729554697,
-8.50392173010724,
-9.144545667572917,
-9.749001177027452,
-9.86067549416173,
-9.780325128102534,
-9.370063096395077,
-9.55921751209197,
-9.166669725631582,
-8.242126568226608,
-8.121007778923587,
-8.574032525818854,
-8.276082693813606,
-8.658124508393247,
-9.105602126512863,
-9.751173562587569,
-8.845581010393696,
-8.462260792362443,
-8.448264116896905,
-8.7563671026177,
-9.45011626943263,
-8.553347424241819,
-8.872524389800127,
-8.294237400502313,
-7.807817519614169,
-8.011783336431796,
-7.245946866963806,
-7.740874527649886,
-6.972302076879126,
-6.102156332802293,
-5.128078710802705,
-6.030847985672251,
-6.55220389005509,
-5.7147220092837605,
-5.580195621744965,
-5.4333916937427915,
-5.389143214531182,
-5.243420996868201,
-5.948172123276505,
-5.054532081106954,
-4.121597122186795,
-4.794192476308735,
-4.150554194762104,
-5.0242960518578315,
-4.130686582536956,
-3.2109211706024454,
-4.019483184341093,
-3.2852721382490797,
-3.580914795792229,
-2.585455404639239,
-2.7764497931388963,
-2.30074623665437,
-3.2609033897113644,
-2.9668226842774548,
-2.841538535165231,
-2.5163355228038347,
-2.197645527306796,
-1.8284726756047172,
-2.5490572672802285,
-2.302690325530045,
-1.5091368096144677,
-0.6753722632710051,
-0.797134260885582,
-0.7682061692070719,

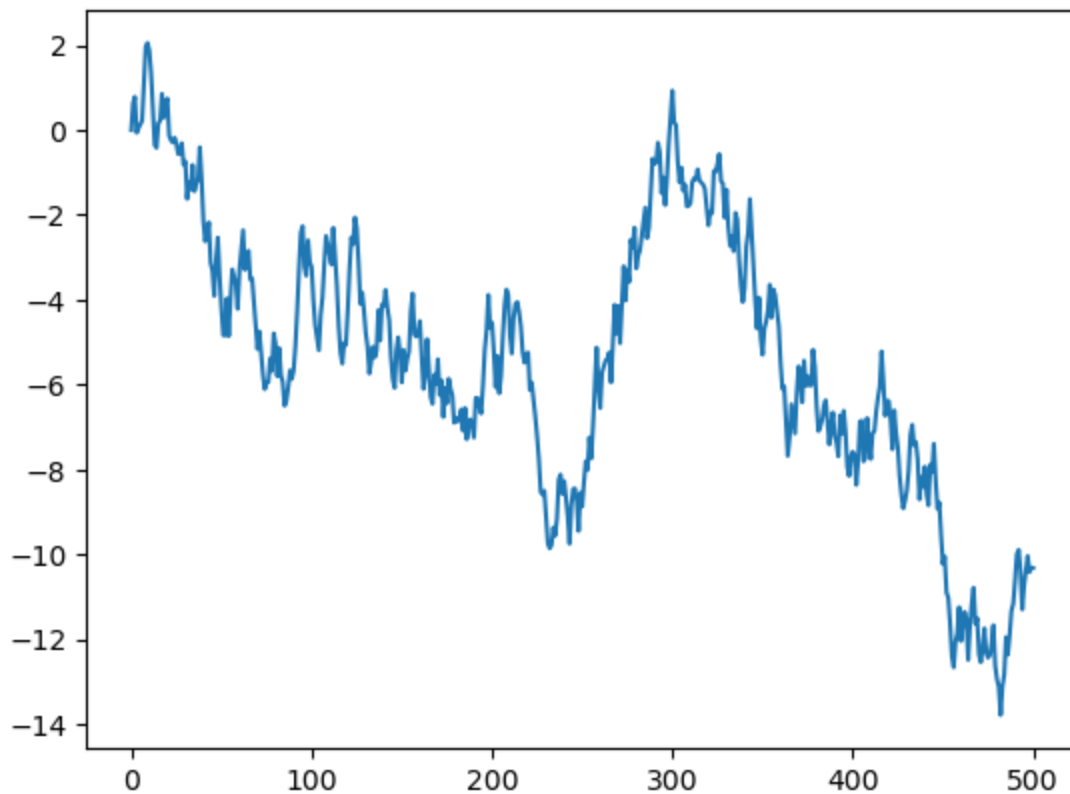
-0.2990799127720356,
-0.5228345338593805,
-1.485932860023407,
-1.1151936026301925,
-1.7668919003062962,
-1.1491572388850668,
-0.3008193737270808,
0.3483065033405004,
0.9284788330757472,
0.16365590617670978,
0.12901744460996412,
-0.7528508118125907,
-1.2337431667598566,
-0.8854709005321577,
-1.43031109999245,
-1.2879282101605207,
-1.7985669015804508,
-1.785968234271087,
-1.726031485684331,
-1.2363449550719607,
-1.1352334300246092,
-1.1596646844314906,
-0.9260744857893028,
-1.182579543032655,
-1.2389980198606714,
-1.2817369116601398,
-1.383182012502882,
-1.794901891418436,
-2.243294540256481,
-1.9172072164721057,
-1.9620473868822246,
-0.9665018371874352,
-0.9894110890568879,
-0.8028697550313564,
-0.564983065585893,
-1.2078631491829406,
-1.2593256005810773,
-2.0641182190161214,
-1.4044785620097695,
-2.270541941860592,
-2.725569363024054,
-2.508446354156529,
-2.8558192086807095,
-1.9540523117215987,
-2.1130940290622524,
-3.052454240760702,
-3.662211966462056,
-4.053351044603625,
-3.745431093997303,
-2.748115742687384,
-2.4205204421430704,
-1.627897563666618,
-2.42061039790339,
-3.164269116554633,
-4.044545976979134,
-4.6789327628830115,
-3.949818851295311,
-4.8959317630274555,
-5.295167025286185,
-4.676435642922792,
-4.521227144050453,
-4.24425015210281,
-3.6469116991890638,
-4.4232081338869484,
-3.7542580021672363,
-3.8912847619494286,

-4.267480863825168,
-4.618354733176355,
-5.490864975390422,
-6.10008378643738,
-6.044012022989332,
-6.902687275086814,
-7.679509714032808,
-7.235895296303897,
-6.4646164899410365,
-6.829499676962022,
-7.151690932532098,
-6.182046855056625,
-5.572415398035046,
-5.870404762257222,
-6.415755258139587,
-5.438275383860889,
-6.030975328546143,
-5.802817346315388,
-6.017694552569309,
-6.018849188588022,
-5.179696761698363,
-5.585548071294325,
-6.523833400021784,
-7.09629249302907,
-6.985341436735435,
-6.830289401208935,
-6.512626306124628,
-6.368553436077409,
-6.851569805914414,
-7.4121917571335985,
-6.964091435001192,
-6.659817240562088,
-7.213290969954985,
-7.355174771625919,
-7.689988896343897,
-6.728659407847873,
-7.1595914350737715,
-6.620598691374842,
-7.115942562678249,
-7.941362677534395,
-8.153151849161429,
-7.693128020564108,
-7.582048214701379,
-7.6782199993718185,
-8.363796503974527,
-7.80327838325835,
-6.8760046987939205,
-6.853290011827867,
-7.811204110452693,
-7.732105743255204,
-6.789124513698431,
-7.440855629081209,
-7.753469679288945,
-7.139017680323228,
-7.102592373666621,
-6.6437479511466275,
-6.305452503976619,
-6.04250833321854,
-5.219264383389691,
-5.931970759703635,
-6.73543438614916,
-6.38683675971866,
-6.389739582080046,
-6.834295786222951,
-7.52455042353078,
-6.608096206403452,

-7.128475545792817,
-7.468055544640988,
-8.16004977466903,
-8.593377411212655,
-8.919580461553569,
-8.739054549325918,
-8.49863148790294,
-8.025665580875406,
-7.184874346303538,
-6.949074772456696,
-7.432866337083035,
-7.351656267109127,
-7.755154865792067,
-8.704741486724629,
-8.17761433389234,
-8.408895957514858,
-7.935450353510899,
-8.598228693787801,
-8.844620331843508,
-7.888161547598323,
-8.065716051710902,
-7.397032572892403,
-8.266903219062428,
-8.928641040476322,
-8.78221038589191,
-9.558958593958959,
-10.229411982664882,
-10.05678912965381,
-10.898464125616774,
-11.027880043408883,
-11.641825934912015,
-12.411010604788345,
-12.663412059480665,
-12.055073435062726,
-11.860180603613749,
-11.248014083185716,
-12.04530539983007,
-11.65305852157066,
-11.35601880591284,
-11.524946530613878,
-12.48918912835428,
-11.68149862941877,
-11.162675819771318,
-10.788880902719708,
-11.63373090526547,
-11.505549014326885,
-12.361246157725066,
-12.547147022484312,
-12.210522519698332,
-11.746804215200635,
-12.320886419046754,
-12.438400120657606,
-12.381287206639753,
-12.08571109069078,
-11.6733116030428,
-12.633957701851813,
-12.948331643239392,
-13.126045240347855,
-13.787732754859366,
-13.114744697360019,
-12.840057401088567,
-11.955256033783867,
-12.364341479751499,
-11.906352163165844,
-11.328249671810479,
-11.167386423449564,


```
-10.623073186907721,
-10.004245803957964,
-9.893886891281495,
-10.384118640024177,
-11.29997824340654,
-10.73815628347974,
-10.383680494100396,
-10.04205327451757,
-10.421788547909024,
-10.317182218362264,
-10.322884216852433]
```

```
In [5]: plt.plot(time_series)
plt.show()
```



2 - Graficar una serie de tiempo de los ejemplos del repositorio

```
In [6]: import pandas as pd
```

```
In [7]: df = pd.read_csv('YPFD.2000.2021.csv', sep=',')
```

```
In [8]: df
```

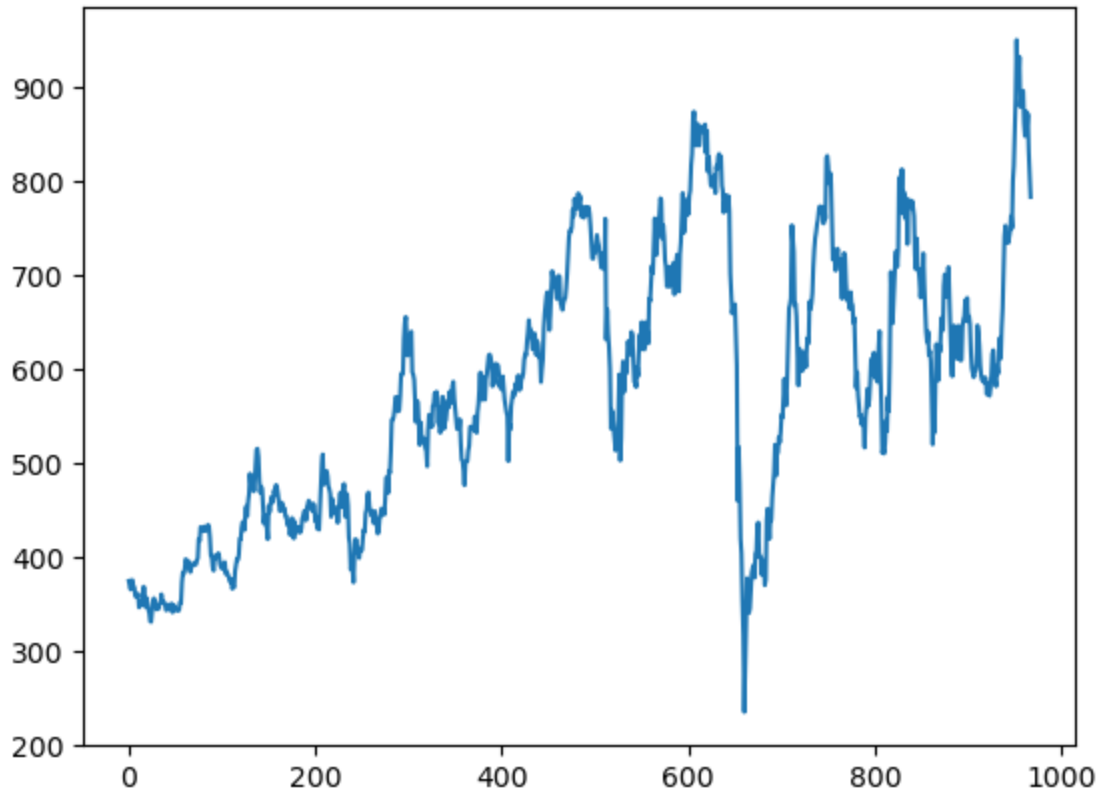
```
Out[8]:
```

	Unnamed: 0	fechaHora	ultimoPrecio
0	0	2021-06-29 17:00:01.710	783.15
1	1	2021-06-28 17:00:03.613	807.00
2	2	2021-06-25 17:00:02.397	831.65
3	3	2021-06-24 17:00:03.497	871.40
4	4	2021-06-23 17:00:03.290	857.65

...
4835	4835	2001-12-07 00:00:00.000	0.00
4836	4836	2001-12-06 00:00:00.000	0.00
4837	4837	2001-12-05 00:00:00.000	0.00
4838	4838	2001-12-04 00:00:00.000	0.00
4839	4839	2001-12-03 00:00:00.000	0.00

4840 rows × 3 columns

```
In [9]: plt.plot(df.ultimoPrecio.to_list()[:968][::-1])
plt.show()
```



3 - Redactar un informe describiendo 3 series de tiempo distintas

1

```
In [18]: df = pd.read_csv('datasets/daily-website-visitors.csv', sep=',')
```

```
In [42]: df["Page.Loads"] = pd.to_numeric(df["Page.Loads"].str.replace(",",""))
```

```
In [50]: ax = df.plot(x="Date", y='Page.Loads', rot=90)
ax.set_ylabel("Visitas", fontsize=16)
ax.set_xlabel("Fecha", fontsize=16)
ax.set_title("Visitas al sitio web statforecasting.com por dia")
```

```
Out[50]: Text(0.5, 1.0, 'Visitas al sitio web statforecasting.com por dia')
```


1	1950-01-04	16.850000	16.850000	16.850000	16.850000	16.850000	1890000
2	1950-01-05	16.930000	16.930000	16.930000	16.930000	16.930000	2550000
3	1950-01-06	16.980000	16.980000	16.980000	16.980000	16.980000	2010000
4	1950-01-09	17.080000	17.080000	17.080000	17.080000	17.080000	2520000
...
17213	2018-05-31	2720.979980	2722.500000	2700.679932	2705.270020	2705.270020	4235370000
17214	2018-06-01	2718.699951	2736.929932	2718.699951	2734.620117	2734.620117	3684130000
17215	2018-06-04	2741.669922	2749.159912	2740.540039	2746.870117	2746.870117	3376510000
17216	2018-06-05	2748.459961	2752.610107	2739.510010	2748.800049	2748.800049	3517790000
17217	2018-06-06	2753.250000	2772.389893	2748.459961	2772.350098	2772.350098	3651640000

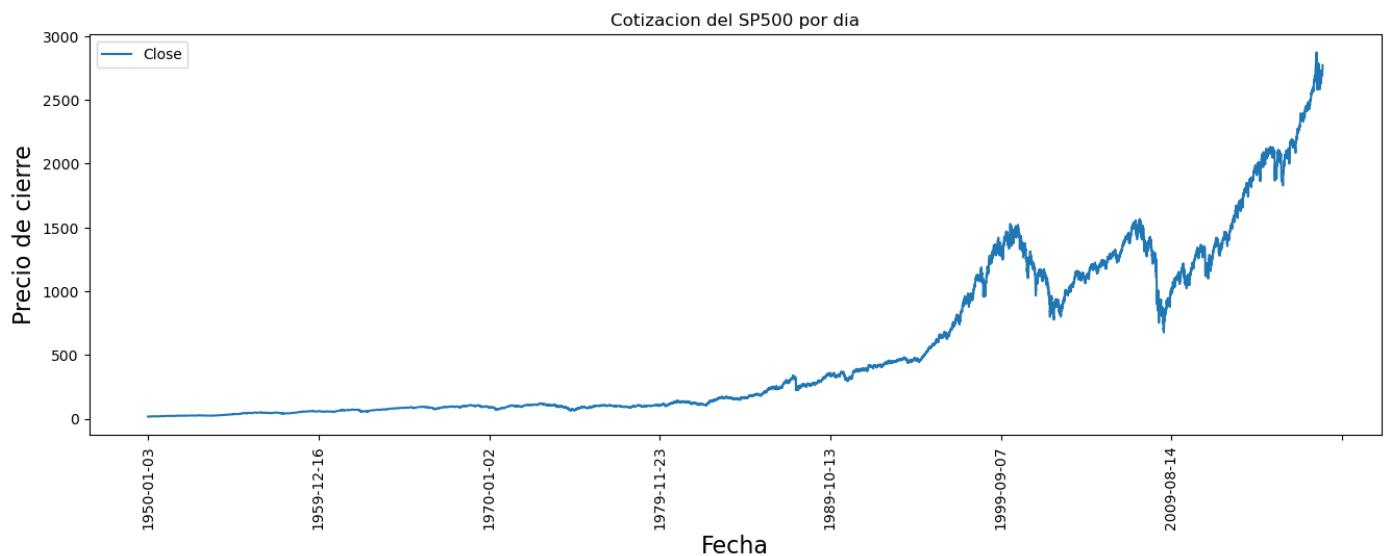
17218 rows × 7 columns

```
In [78]: df["Date"][: -1]
```

```
Out[78]: 0      1950-01-03
1      1950-01-04
2      1950-01-05
3      1950-01-06
4      1950-01-09
...
17212   2018-05-30
17213   2018-05-31
17214   2018-06-01
17215   2018-06-04
17216   2018-06-05
Name: Date, Length: 17217, dtype: object
```

```
In [76]: ax = df.plot(x="Date",y='Close',rot=90)
ax.set_ylabel("Precio de cierre en USD", fontsize=16)
ax.set_xlabel("Fecha", fontsize=16)
ax.set_title("Cotizacion del SP500 por dia")
```

```
Out[76]: Text(0.5, 1.0, 'Cotizacion del SP500 por dia')
```



Esta serie de tiempo indica la cotizacion del SP500 en dolares por dia desde 1950 hasta 2018, podemos notar una clara tendencia alcista, con un crecimiento mas rapido a partir de finales de los años 80. A partir de estos años tambien podemos notar 2 grandes momentos de caida del precio de este, uno referente a la

explosión de la burbuja punto com en los primeros años del siglo 21 y la otra a la crisis de hipotecas de Estados Unidos en el año 2008.

3

```
In [80]: df = pd.read_csv('datasets/walmart-sales-dataset-of-45stores.csv', sep=',')
```

```
In [82]: df
```

```
Out[82]:
```

	Store	Date	Weekly_Sales	Holiday_Flag	Temperature	Fuel_Price	CPI	Unemployment
0	1	05-02-2010	1643690.90	0	42.31	2.572	211.096358	8.106
1	1	12-02-2010	1641957.44	1	38.51	2.548	211.242170	8.106
2	1	19-02-2010	1611968.17	0	39.93	2.514	211.289143	8.106
3	1	26-02-2010	1409727.59	0	46.63	2.561	211.319643	8.106
4	1	05-03-2010	1554806.68	0	46.50	2.625	211.350143	8.106
...
6430	45	28-09-2012	713173.95	0	64.88	3.997	192.013558	8.684
6431	45	05-10-2012	733455.07	0	64.89	3.985	192.170412	8.667
6432	45	12-10-2012	734464.36	0	54.47	4.000	192.327265	8.667
6433	45	19-10-2012	718125.53	0	56.47	3.969	192.330854	8.667
6434	45	26-10-2012	760281.43	0	58.85	3.882	192.308899	8.667

6435 rows × 8 columns

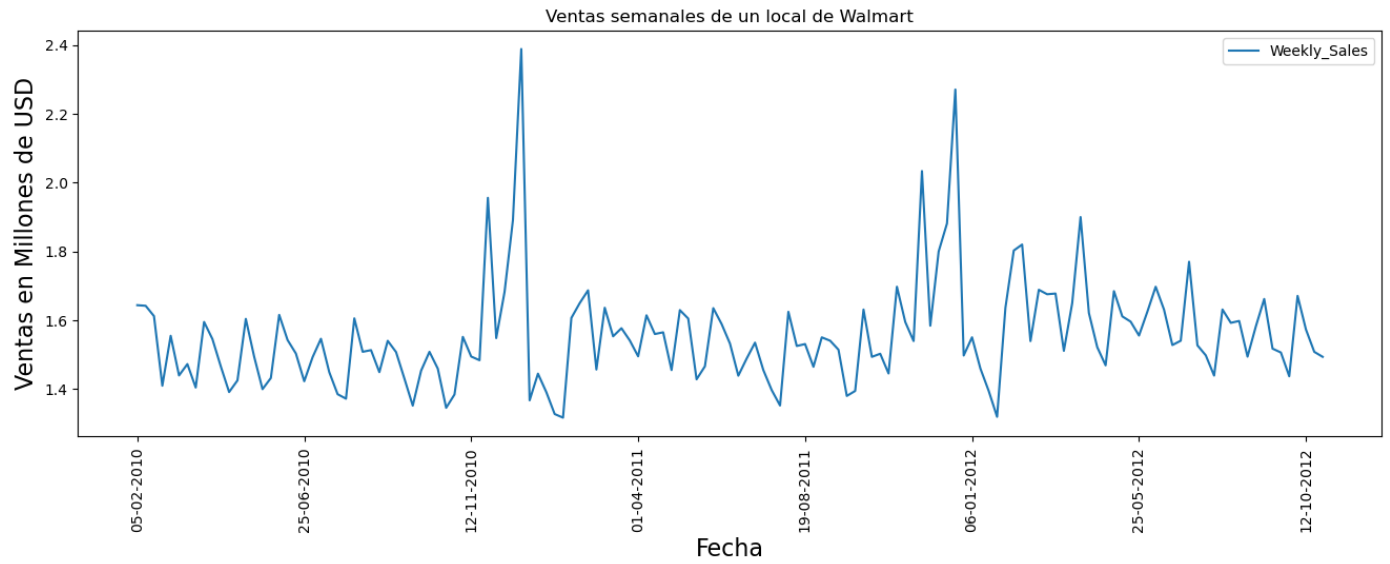
```
In [89]: df2 = df[df['Store'] == 1]
df2["Weekly_Sales"] = df["Weekly_Sales"]/1000000
```

```
C:\Users\Colo\AppData\Local\Temp\ipykernel_18128\709591447.py:2: 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
df2["Weekly_Sales"] = df["Weekly_Sales"]/1000000
```

```
In [90]: ax = df2.plot(x="Date",y='Weekly_Sales',rot=90)
ax.set_ylabel("Ventas en Millones de USD", fontsize=16)
ax.set_xlabel("Fecha", fontsize=16)
ax.set_title("Ventas semanales de un local de Walmart")
```

```
Out[90]: Text(0.5, 1.0, 'Ventas semanales de un local de Walmart')
```



La serie de tiempo muestra las ventas semanales de un local de Walmart en Estados Unidos, expresados en USD, desde el año 2010 al año 2012. Podemos notar una clara estacionalidad en las ventas, pero con fuertes incrementos en las ventas ingresando en el mes de diciembre y que terminan una vez que este termina.