

# Causality analysis on stocks in R

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## Packages

```
library(dplyr)
```

```
##  
## Attaching package: 'dplyr'  
  
## The following objects are masked from 'package:stats':  
##  
##   filter, lag  
  
## The following objects are masked from 'package:base':  
##  
##   intersect, setdiff, setequal, union
```

```
library(readxl)
```

```
library(tseries)
```

```
## Registered S3 method overwritten by 'quantmod':  
##   method      from  
##   as.zoo.data.frame zoo
```

```
library(aTSA)
```

```
##  
## Attaching package: 'aTSA'  
  
## The following objects are masked from 'package:tseries':  
##  
##   adf.test, kpss.test, pp.test  
  
## The following object is masked from 'package:graphics':  
##  
##   identify
```

```
library(lmtest)
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##      as.Date, as.Date.numeric
```

```
library(corrplot)
```

```
## corrplot 0.92 loaded
```

## Dataset

```
AAPL = read_excel("AAPL.xlsx")
WMT = read_excel("WMT.xlsx")

df = data.frame(AAPL$Date, AAPL$Close, WMT$Close)
df
```

```
##      AAPL.Date AAPL.Close WMT.Close
## 1  2010-06-30   8.983214   48.07
## 2  2010-07-01   8.874286   48.34
## 3  2010-07-02   8.819286   48.00
## 4  2010-07-06   8.879643   48.57
## 5  2010-07-07   9.238214   48.92
## 6  2010-07-08   9.217500   49.18
## 7  2010-07-09   9.272143   49.43
## 8  2010-07-12   9.188929   50.12
## 9  2010-07-13   8.992857   50.54
## 10 2010-07-14   9.026071   50.35
## 11 2010-07-15   8.980357   50.41
## 12 2010-07-16   8.925000   49.67
## 13 2010-07-19   8.770714   49.52
## 14 2010-07-20   8.996071   50.88
## 15 2010-07-21   9.080000   50.35
## 16 2010-07-22   9.250714   50.86
## 17 2010-07-23   9.283571   51.67
## 18 2010-07-26   9.260000   51.13
## 19 2010-07-27   9.431429   50.96
## 20 2010-07-28   9.320000   51.13
## 21 2010-07-29   9.218214   51.06
## 22 2010-07-30   9.187500   51.19
## 23 2010-08-02   9.351786   51.41
## 24 2010-08-03   9.354643   51.29
## 25 2010-08-04   9.392143   51.60
## 26 2010-08-05   9.346429   51.62
## 27 2010-08-06   9.288929   51.79
## 28 2010-08-09   9.348214   52.06
## 29 2010-08-10   9.264643   52.22
## 30 2010-08-11   8.935357   51.02
## 31 2010-08-12   8.992500   50.43
```

## 32	2010-08-13	8.896429	50.40
## 33	2010-08-16	8.844286	50.41
## 34	2010-08-17	8.998929	51.02
## 35	2010-08-18	9.038214	50.86
## 36	2010-08-19	8.924286	50.06
## 37	2010-08-20	8.915714	50.22
## 38	2010-08-23	8.778571	51.14
## 39	2010-08-24	8.568929	51.30
## 40	2010-08-25	8.674643	51.55
## 41	2010-08-26	8.581429	50.97
## 42	2010-08-27	8.629286	51.00
## 43	2010-08-30	8.660714	50.55
## 44	2010-08-31	8.682143	50.14
## 45	2010-09-01	8.940357	51.20
## 46	2010-09-02	9.006071	51.76
## 47	2010-09-03	9.241786	52.04
## 48	2010-09-07	9.207500	51.86
## 49	2010-09-08	9.390000	51.83
## 50	2010-09-09	9.395357	51.91
## 51	2010-09-10	9.407500	51.97
## 52	2010-09-13	9.537143	52.21
## 53	2010-09-14	9.573571	52.66
## 54	2010-09-15	9.650714	52.86
## 55	2010-09-16	9.877500	53.15
## 56	2010-09-17	9.834643	53.01
## 57	2010-09-20	10.115357	53.54
## 58	2010-09-21	10.134643	53.57
## 59	2010-09-22	10.276786	53.82
## 60	2010-09-23	10.318571	53.65
## 61	2010-09-24	10.440000	54.08
## 62	2010-09-27	10.398571	53.48
## 63	2010-09-28	10.245000	53.82
## 64	2010-09-29	10.263214	53.35
## 65	2010-09-30	10.133929	53.52
## 66	2010-10-01	10.090000	53.36
## 67	2010-10-04	9.951429	53.57
## 68	2010-10-05	10.319286	54.00
## 69	2010-10-06	10.328214	54.56
## 70	2010-10-07	10.329286	54.36
## 71	2010-10-08	10.502500	54.41
## 72	2010-10-11	10.548571	54.61
## 73	2010-10-12	10.662143	53.92
## 74	2010-10-13	10.719286	53.82
## 75	2010-10-14	10.796786	53.25
## 76	2010-10-15	11.240714	53.35
## 77	2010-10-18	11.357143	53.76
## 78	2010-10-19	11.053214	53.32
## 79	2010-10-20	11.090357	53.47
## 80	2010-10-21	11.054286	54.03
## 81	2010-10-22	10.981071	54.06
## 82	2010-10-25	11.030000	53.95
## 83	2010-10-26	11.001786	54.56
## 84	2010-10-27	10.993929	53.87
## 85	2010-10-28	10.901429	54.08

## 86	2010-10-29	10.749286	54.17
## 87	2010-11-01	10.863571	54.31
## 88	2010-11-02	11.048571	54.79
## 89	2010-11-03	11.171429	54.91
## 90	2010-11-04	11.366786	55.36
## 91	2010-11-05	11.326071	55.20
## 92	2010-11-08	11.379286	54.91
## 93	2010-11-09	11.288571	55.05
## 94	2010-11-10	11.358214	54.51
## 95	2010-11-11	11.308929	54.34
## 96	2010-11-12	11.001071	54.13
## 97	2010-11-15	10.965714	53.95
## 98	2010-11-16	10.771071	54.26
## 99	2010-11-17	10.732143	53.77
## 100	2010-11-18	11.015357	53.98
## 101	2010-11-19	10.954643	54.39
## 102	2010-11-22	11.191429	54.38
## 103	2010-11-23	11.026071	53.67
## 104	2010-11-24	11.242857	54.01
## 105	2010-11-26	11.250000	53.74
## 106	2010-11-29	11.316786	53.85
## 107	2010-11-30	11.112500	54.09
## 108	2010-12-01	11.300000	54.70
## 109	2010-12-02	11.362500	54.75
## 110	2010-12-03	11.337143	54.62
## 111	2010-12-06	11.433929	54.49
## 112	2010-12-07	11.364643	55.09
## 113	2010-12-08	11.464643	54.49
## 114	2010-12-09	11.420000	54.34
## 115	2010-12-10	11.448571	54.28
## 116	2010-12-13	11.488214	54.21
## 117	2010-12-14	11.438929	54.45
## 118	2010-12-15	11.441429	54.23
## 119	2010-12-16	11.473214	54.63
## 120	2010-12-17	11.450357	54.41
## 121	2010-12-20	11.507500	53.77
## 122	2010-12-21	11.578571	53.65
## 123	2010-12-22	11.612857	53.31
## 124	2010-12-23	11.557143	53.60
## 125	2010-12-27	11.595714	53.57
## 126	2010-12-28	11.623929	53.74
## 127	2010-12-29	11.617500	54.08
## 128	2010-12-30	11.559286	54.07
## 129	2010-12-31	11.520000	53.93
## 130	2011-01-03	11.770357	54.56
## 131	2011-01-04	11.831786	54.77
## 132	2011-01-05	11.928571	54.41
## 133	2011-01-06	11.918929	53.96
## 134	2011-01-07	12.004286	54.08
## 135	2011-01-10	12.230357	53.73
## 136	2011-01-11	12.201429	54.29
## 137	2011-01-12	12.300714	54.85
## 138	2011-01-13	12.345714	54.79
## 139	2011-01-14	12.445714	54.81

## 140	2011-01-18	12.166071	55.14
## 141	2011-01-19	12.101429	55.03
## 142	2011-01-20	11.881429	55.99
## 143	2011-01-21	11.668571	55.73
## 144	2011-01-24	12.051786	56.05
## 145	2011-01-25	12.192857	57.26
## 146	2011-01-26	12.280357	57.32
## 147	2011-01-27	12.257500	57.57
## 148	2011-01-28	12.003571	56.70
## 149	2011-01-31	12.118571	56.07
## 150	2011-02-01	12.322500	56.33
## 151	2011-02-02	12.297143	55.86
## 152	2011-02-03	12.265714	55.92
## 153	2011-02-04	12.375000	56.03
## 154	2011-02-07	12.567143	56.07
## 155	2011-02-08	12.685714	56.38
## 156	2011-02-09	12.791429	56.73
## 157	2011-02-10	12.662143	55.59
## 158	2011-02-11	12.744643	55.69
## 159	2011-02-14	12.827857	54.80
## 160	2011-02-15	12.853571	54.95
## 161	2011-02-16	12.968929	54.55
## 162	2011-02-17	12.796429	54.75
## 163	2011-02-18	12.520000	55.38
## 164	2011-02-22	12.093214	53.67
## 165	2011-02-23	12.236429	53.03
## 166	2011-02-24	12.245714	52.09
## 167	2011-02-25	12.434286	51.75
## 168	2011-02-28	12.614643	51.98
## 169	2011-03-01	12.475357	52.07
## 170	2011-03-02	12.575714	51.97
## 171	2011-03-03	12.841429	52.01
## 172	2011-03-04	12.857143	52.07
## 173	2011-03-07	12.691429	52.02
## 174	2011-03-08	12.705714	52.44
## 175	2011-03-09	12.588214	52.67
## 176	2011-03-10	12.381071	52.65
## 177	2011-03-11	12.571071	52.59
## 178	2011-03-14	12.627143	52.32
## 179	2011-03-15	12.336786	52.06
## 180	2011-03-16	11.786071	51.38
## 181	2011-03-17	11.951429	51.37
## 182	2011-03-18	11.809643	51.52
## 183	2011-03-21	12.117857	51.92
## 184	2011-03-22	12.185714	52.00
## 185	2011-03-23	12.113929	51.64
## 186	2011-03-24	12.320357	52.59
## 187	2011-03-25	12.555000	52.35
## 188	2011-03-28	12.515714	52.19
## 189	2011-03-29	12.534286	52.26
## 190	2011-03-30	12.451071	52.36
## 191	2011-03-31	12.446786	52.05
## 192	2011-04-01	12.305714	52.13
## 193	2011-04-04	12.185357	52.65

##	194	2011-04-05	12.103214	52.74
##	195	2011-04-06	12.072857	52.98
##	196	2011-04-07	12.074286	53.00
##	197	2011-04-08	11.966429	52.54
##	198	2011-04-11	11.814286	52.82
##	199	2011-04-12	11.871429	53.52
##	200	2011-04-13	12.004643	53.63
##	201	2011-04-14	11.872143	53.50
##	202	2011-04-15	11.695000	53.55
##	203	2011-04-18	11.851786	53.31
##	204	2011-04-19	12.066429	53.35
##	205	2011-04-20	12.228929	53.69
##	206	2011-04-21	12.525000	53.58
##	207	2011-04-25	12.607500	53.37
##	208	2011-04-26	12.515000	53.91
##	209	2011-04-27	12.505357	54.42
##	210	2011-04-28	12.383929	54.69
##	211	2011-04-29	12.504643	54.98
##	212	2011-05-02	12.367143	55.04
##	213	2011-05-03	12.435714	55.46
##	214	2011-05-04	12.484643	55.37
##	215	2011-05-05	12.383929	55.07
##	216	2011-05-06	12.380714	55.02
##	217	2011-05-09	12.414286	55.10
##	218	2011-05-10	12.480357	55.53
##	219	2011-05-11	12.401071	55.17
##	220	2011-05-12	12.377500	55.72
##	221	2011-05-13	12.160714	55.72
##	222	2011-05-16	11.903571	56.06
##	223	2011-05-17	12.005000	55.54
##	224	2011-05-18	12.138214	55.18
##	225	2011-05-19	12.161786	55.48
##	226	2011-05-20	11.972143	55.29
##	227	2011-05-23	11.942857	55.22
##	228	2011-05-24	11.863929	54.78
##	229	2011-05-25	12.027857	54.56
##	230	2011-05-26	11.964286	54.62
##	231	2011-05-27	12.050357	54.70
##	232	2011-05-31	12.422500	55.22
##	233	2011-06-01	12.339643	54.30
##	234	2011-06-02	12.360714	53.55
##	235	2011-06-03	12.265714	53.66
##	236	2011-06-06	12.072857	53.76
##	237	2011-06-07	11.858571	53.83
##	238	2011-06-08	11.865714	53.69
##	239	2011-06-09	11.838929	53.62
##	240	2011-06-10	11.639286	52.72
##	241	2011-06-13	11.664286	52.62
##	242	2011-06-14	11.872857	52.91
##	243	2011-06-15	11.669643	52.32
##	244	2011-06-16	11.612857	52.83
##	245	2011-06-17	11.437857	52.82
##	246	2011-06-20	11.261429	53.04
##	247	2011-06-21	11.617857	53.29

##	248	2011-06-22	11.521786	53.01
##	249	2011-06-23	11.829643	53.29
##	250	2011-06-24	11.655357	52.41
##	251	2011-06-27	11.858571	52.29
##	252	2011-06-28	11.973571	52.53
##	253	2011-06-29	11.930000	52.64
##	254	2011-06-30	11.988214	53.14
##	255	2011-07-01	12.259286	53.51
##	256	2011-07-05	12.479643	53.39
##	257	2011-07-06	12.562857	53.72
##	258	2011-07-07	12.757143	54.49
##	259	2011-07-08	12.846786	54.08
##	260	2011-07-11	12.642857	53.87
##	261	2011-07-12	12.633929	53.94
##	262	2011-07-13	12.786429	54.02
##	263	2011-07-14	12.777500	53.63
##	264	2011-07-15	13.032857	53.63
##	265	2011-07-18	13.350000	53.32
##	266	2011-07-19	13.458929	53.97
##	267	2011-07-20	13.817857	53.89
##	268	2011-07-21	13.831786	54.47
##	269	2011-07-22	14.046429	54.52
##	270	2011-07-25	14.232143	53.97
##	271	2011-07-26	14.407500	53.59
##	272	2011-07-27	14.021071	53.25
##	273	2011-07-28	13.993571	52.99
##	274	2011-07-29	13.945714	52.71
##	275	2011-08-01	14.169643	52.62
##	276	2011-08-02	13.889643	51.68
##	277	2011-08-03	14.020357	51.28
##	278	2011-08-04	13.477500	50.10
##	279	2011-08-05	13.343571	50.85
##	280	2011-08-08	12.614643	48.92
##	281	2011-08-09	13.357500	50.82
##	282	2011-08-10	12.988929	48.41
##	283	2011-08-11	13.346429	49.73
##	284	2011-08-12	13.463929	49.75
##	285	2011-08-15	13.693214	49.98
##	286	2011-08-16	13.588571	51.92
##	287	2011-08-17	13.587143	51.55
##	288	2011-08-18	13.073214	51.79
##	289	2011-08-19	12.715357	52.30
##	290	2011-08-22	12.730000	52.19
##	291	2011-08-23	13.342857	53.21
##	292	2011-08-24	13.435000	53.37
##	293	2011-08-25	13.347143	52.70
##	294	2011-08-26	13.699286	52.90
##	295	2011-08-29	13.927500	53.19
##	296	2011-08-30	13.928214	52.82
##	297	2011-08-31	13.743929	53.19
##	298	2011-09-01	13.608214	52.65
##	299	2011-09-02	13.358929	52.03
##	300	2011-09-06	13.562143	51.68
##	301	2011-09-07	13.711786	52.42

##	302	2011-09-08	13.719286	52.21
##	303	2011-09-09	13.481429	51.36
##	304	2011-09-12	13.569286	51.82
##	305	2011-09-13	13.736429	51.59
##	306	2011-09-14	13.903571	52.20
##	307	2011-09-15	14.034286	52.51
##	308	2011-09-16	14.303571	52.65
##	309	2011-09-19	14.701071	52.45
##	310	2011-09-20	14.766071	52.29
##	311	2011-09-21	14.719286	51.32
##	312	2011-09-22	14.350714	50.28
##	313	2011-09-23	14.439286	50.80
##	314	2011-09-26	14.398929	51.83
##	315	2011-09-27	14.259286	52.03
##	316	2011-09-28	14.178929	51.31
##	317	2011-09-29	13.948929	51.93
##	318	2011-09-30	13.618571	51.90
##	319	2011-10-03	13.378571	51.96
##	320	2011-10-04	13.303571	52.88
##	321	2011-10-05	13.508929	52.65
##	322	2011-10-06	13.477500	52.75
##	323	2011-10-07	13.207143	53.70
##	324	2011-10-10	13.886071	54.81
##	325	2011-10-11	14.296071	54.72
##	326	2011-10-12	14.363929	55.20
##	327	2011-10-13	14.586786	55.02
##	328	2011-10-14	15.071429	55.46
##	329	2011-10-17	14.999643	54.78
##	330	2011-10-18	15.080000	55.89
##	331	2011-10-19	14.236429	56.25
##	332	2011-10-20	14.118214	56.37
##	333	2011-10-21	14.031071	56.92
##	334	2011-10-24	14.491786	56.78
##	335	2011-10-25	14.206071	56.71
##	336	2011-10-26	14.307143	57.37
##	337	2011-10-27	14.453214	57.81
##	338	2011-10-28	14.462500	57.15
##	339	2011-10-31	14.456429	56.72
##	340	2011-11-01	14.161071	56.23
##	341	2011-11-02	14.193214	56.86
##	342	2011-11-03	14.395357	57.42
##	343	2011-11-04	14.294286	57.50
##	344	2011-11-07	14.276071	57.94
##	345	2011-11-08	14.508214	59.32
##	346	2011-11-09	14.117143	58.05
##	347	2011-11-10	13.757857	58.13
##	348	2011-11-11	13.736429	59.20
##	349	2011-11-14	13.545000	58.89
##	350	2011-11-15	13.886786	57.46
##	351	2011-11-16	13.741786	56.68
##	352	2011-11-17	13.478929	56.73
##	353	2011-11-18	13.390714	57.23
##	354	2011-11-21	13.178929	56.66
##	355	2011-11-22	13.446786	56.85



##	356	2011-11-23	13.106786	56.64
##	357	2011-11-25	12.984643	56.89
##	358	2011-11-28	13.432857	57.25
##	359	2011-11-29	13.328571	58.17
##	360	2011-11-30	13.650000	58.90
##	361	2011-12-01	13.854643	58.61
##	362	2011-12-02	13.917857	58.09
##	363	2011-12-05	14.036071	58.34
##	364	2011-12-06	13.962500	58.78
##	365	2011-12-07	13.896071	58.51
##	366	2011-12-08	13.952143	57.98
##	367	2011-12-09	14.057857	58.32
##	368	2011-12-12	13.994286	58.09
##	369	2011-12-13	13.886071	57.60
##	370	2011-12-14	13.578214	57.65
##	371	2011-12-15	13.533571	57.95
##	372	2011-12-16	13.607857	58.27
##	373	2011-12-19	13.650357	57.78
##	374	2011-12-20	14.141071	59.19
##	375	2011-12-21	14.158929	59.39
##	376	2011-12-22	14.233929	59.19
##	377	2011-12-23	14.404643	59.99
##	378	2011-12-27	14.518929	59.83
##	379	2011-12-28	14.380000	59.73
##	380	2011-12-29	14.468571	59.99
##	381	2011-12-30	14.464286	59.76
##	382	2012-01-03	14.686786	60.33
##	383	2012-01-04	14.765714	59.71
##	384	2012-01-05	14.929643	59.42
##	385	2012-01-06	15.085714	59.00
##	386	2012-01-09	15.061786	59.18
##	387	2012-01-10	15.115714	59.04
##	388	2012-01-11	15.091071	59.40
##	389	2012-01-12	15.049643	59.50
##	390	2012-01-13	14.993214	59.54
##	391	2012-01-17	15.167857	59.85
##	392	2012-01-18	15.325357	60.01
##	393	2012-01-19	15.276786	60.61
##	394	2012-01-20	15.010714	61.01
##	395	2012-01-23	15.264643	60.91
##	396	2012-01-24	15.014643	61.39
##	397	2012-01-25	15.952143	61.47
##	398	2012-01-26	15.879643	60.97
##	399	2012-01-27	15.974286	60.71
##	400	2012-01-30	16.178928	61.30
##	401	2012-01-31	16.302856	61.36
##	402	2012-02-01	16.292500	62.18
##	403	2012-02-02	16.254286	61.94
##	404	2012-02-03	16.417143	62.03
##	405	2012-02-06	16.570356	61.88
##	406	2012-02-07	16.743929	61.69
##	407	2012-02-08	17.024286	61.62
##	408	2012-02-09	17.613214	61.96
##	409	2012-02-10	17.622143	61.90

## 410	2012-02-13	17.950001	61.79
## 411	2012-02-14	18.195000	62.22
## 412	2012-02-15	17.773930	61.76
## 413	2012-02-16	17.936071	62.04
## 414	2012-02-17	17.932858	62.48
## 415	2012-02-21	18.387501	60.07
## 416	2012-02-22	18.322857	58.60
## 417	2012-02-23	18.442499	58.54
## 418	2012-02-24	18.657499	58.79
## 419	2012-02-27	18.777143	58.46
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## 421	2012-02-29	19.372856	59.08
## 422	2012-03-01	19.445356	58.82
## 423	2012-03-02	19.470715	59.01
## 424	2012-03-05	19.041430	59.40
## 425	2012-03-06	18.937857	58.97
## 426	2012-03-07	18.953215	59.86
## 427	2012-03-08	19.356787	59.77
## 428	2012-03-09	19.470358	60.08
## 429	2012-03-12	19.714287	60.68
## 430	2012-03-13	20.289286	61.00
## 431	2012-03-14	21.056429	61.08
## 432	2012-03-15	20.912857	61.23
## 433	2012-03-16	20.913214	60.84
## 434	2012-03-19	21.467857	60.74
## 435	2012-03-20	21.641430	60.60
## 436	2012-03-21	21.517857	60.56
## 437	2012-03-22	21.405001	60.65
## 438	2012-03-23	21.287500	60.75
## 439	2012-03-26	21.677856	61.20
## 440	2012-03-27	21.945715	61.09
## 441	2012-03-28	22.057858	61.19
## 442	2012-03-29	21.780714	60.82
## 443	2012-03-30	21.412500	61.20
## 444	2012-04-02	22.093929	61.36
## 445	2012-04-03	22.475714	60.65
## 446	2012-04-04	22.296785	60.26
## 447	2012-04-05	22.631430	60.67
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## 449	2012-04-10	22.444286	59.93
## 450	2012-04-11	22.364286	59.80
## 451	2012-04-12	22.241785	60.14
## 452	2012-04-13	21.615356	59.77
## 453	2012-04-16	20.718929	60.58
## 454	2012-04-17	21.775000	61.87
## 455	2012-04-18	21.726429	62.06
## 456	2012-04-19	20.980000	61.75
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## 460	2012-04-25	21.785713	57.36
## 461	2012-04-26	21.703571	58.95
## 462	2012-04-27	21.535713	59.03
## 463	2012-04-30	20.856428	58.91

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## 466	2012-05-03	20.779285	58.99
## 467	2012-05-04	20.187500	58.70
## 468	2012-05-07	20.338572	59.19
## 469	2012-05-08	20.292143	59.05
## 470	2012-05-09	20.327856	59.03
## 471	2012-05-10	20.375713	59.19
## 472	2012-05-11	20.239643	59.42
## 473	2012-05-14	19.936428	59.07
## 474	2012-05-15	19.756071	59.35
## 475	2012-05-16	19.502857	59.19
## 476	2012-05-17	18.932858	61.68
## 477	2012-05-18	18.942142	62.43
## 478	2012-05-21	20.045713	63.04
## 479	2012-05-22	19.891787	63.73
## 480	2012-05-23	20.377144	64.58
## 481	2012-05-24	20.190001	65.07
## 482	2012-05-25	20.081785	65.31
## 483	2012-05-29	20.438213	65.68
## 484	2012-05-30	20.684643	65.44
## 485	2012-05-31	20.633215	65.82
## 486	2012-06-01	20.035357	65.55
## 487	2012-06-04	20.153214	65.99
## 488	2012-06-05	20.101070	65.50
## 489	2012-06-06	20.409286	65.93
## 490	2012-06-07	20.418571	65.87
## 491	2012-06-08	20.725714	68.22
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## 493	2012-06-12	20.577143	67.72
## 494	2012-06-13	20.434286	67.07
## 495	2012-06-14	20.411785	67.63
## 496	2012-06-15	20.504642	67.75
## 497	2012-06-18	20.920713	68.12
## 498	2012-06-19	20.978930	67.81
## 499	2012-06-20	20.919287	68.52
## 500	2012-06-21	20.631071	67.70
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## 502	2012-06-25	20.384644	68.18
## 503	2012-06-26	20.429644	68.58
## 504	2012-06-27	20.517857	68.59
## 505	2012-06-28	20.323214	68.30
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## 507	2012-07-02	21.161428	69.35
## 508	2012-07-03	21.407499	70.75
## 509	2012-07-05	21.783571	71.08
## 510	2012-07-06	21.638571	71.36
## 511	2012-07-09	21.924643	71.76
## 512	2012-07-10	21.721786	72.11
## 513	2012-07-11	21.586786	72.26
## 514	2012-07-12	21.389286	72.31
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## 516	2012-07-16	21.675358	72.98
## 517	2012-07-17	21.676430	73.10

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##	521	2012-07-23	21.565357	71.85
##	522	2012-07-24	21.461430	72.14
##	523	2012-07-25	20.534643	72.08
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##	525	2012-07-27	20.898571	74.52
##	526	2012-07-30	21.251072	74.98
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##	529	2012-08-02	21.706785	74.05
##	530	2012-08-03	21.989286	74.55
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##	533	2012-08-08	22.137857	74.31
##	534	2012-08-09	22.168928	73.85
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##	536	2012-08-13	22.500000	73.40
##	537	2012-08-14	22.560356	74.01
##	538	2012-08-15	22.529642	74.45
##	539	2012-08-16	22.726429	72.15
##	540	2012-08-17	23.146786	71.99
##	541	2012-08-20	23.755358	72.30
##	542	2012-08-21	23.430714	71.43
##	543	2012-08-22	23.888214	71.77
##	544	2012-08-23	23.665358	71.56
##	545	2012-08-24	23.686428	72.11
##	546	2012-08-27	24.131430	72.50
##	547	2012-08-28	24.100000	72.41
##	548	2012-08-29	24.052500	72.77
##	549	2012-08-30	23.709642	72.25
##	550	2012-08-31	23.758572	72.60
##	551	2012-09-04	24.106071	73.51
##	552	2012-09-05	23.936787	73.55
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##	554	2012-09-07	24.301430	73.82
##	555	2012-09-10	23.669287	73.51
##	556	2012-09-11	23.592501	74.06
##	557	2012-09-12	23.921070	74.07
##	558	2012-09-13	24.392143	75.14
##	559	2012-09-14	24.688572	74.50
##	560	2012-09-17	24.992144	73.99
##	561	2012-09-18	25.068214	73.95
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##	563	2012-09-20	24.953571	74.75
##	564	2012-09-21	25.003214	74.45
##	565	2012-09-24	24.671070	74.74
##	566	2012-09-25	24.055000	74.26
##	567	2012-09-26	23.756430	74.19
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##	571	2012-10-02	23.618214	73.75

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##	576	2012-10-09	22.708929	74.14
##	577	2012-10-10	22.889643	75.42
##	578	2012-10-11	22.432142	75.01
##	579	2012-10-12	22.489643	75.81
##	580	2012-10-15	22.670000	77.15
##	581	2012-10-16	23.206785	76.91
##	582	2012-10-17	23.021786	77.03
##	583	2012-10-18	22.594286	76.56
##	584	2012-10-19	21.780001	75.62
##	585	2012-10-22	22.643929	75.65
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##	587	2012-10-24	22.029642	74.82
##	588	2012-10-25	21.769285	75.32
##	589	2012-10-26	21.571428	75.11
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##	591	2012-11-01	21.305000	73.45
##	592	2012-11-02	20.600000	72.77
##	593	2012-11-05	20.879286	73.14
##	594	2012-11-06	20.816071	73.76
##	595	2012-11-07	19.928572	73.11
##	596	2012-11-08	19.205357	72.48
##	597	2012-11-09	19.537857	72.31
##	598	2012-11-12	19.386786	72.48
##	599	2012-11-13	19.389286	71.81
##	600	2012-11-14	19.174286	71.31
##	601	2012-11-15	18.772142	68.72
##	602	2012-11-16	18.845715	68.03
##	603	2012-11-19	20.204643	69.02
##	604	2012-11-20	20.032499	69.00
##	605	2012-11-21	20.060715	68.89
##	606	2012-11-23	20.410713	70.20
##	607	2012-11-26	21.054644	69.91
##	608	2012-11-27	20.885000	69.50
##	609	2012-11-28	20.819286	70.56
##	610	2012-11-29	21.048571	70.83
##	611	2012-11-30	20.902857	72.02
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##	613	2012-12-04	20.566071	72.12
##	614	2012-12-05	19.242500	71.65
##	615	2012-12-06	19.544287	71.59
##	616	2012-12-07	19.044643	72.29
##	617	2012-12-10	18.922144	72.15
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##	620	2012-12-13	18.917500	69.04
##	621	2012-12-14	18.206785	68.75
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##	623	2012-12-18	19.067858	69.50
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##	625	2012-12-20	18.633215	69.00

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##	630	2012-12-28	18.199642	67.61
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##	635	2013-01-07	18.710714	68.40
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##	637	2013-01-09	18.467857	68.57
##	638	2013-01-10	18.696787	68.36
##	639	2013-01-11	18.582144	68.63
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##	641	2013-01-15	17.354286	68.98
##	642	2013-01-16	18.074642	69.21
##	643	2013-01-17	17.952856	68.85
##	644	2013-01-18	17.857143	69.20
##	645	2013-01-22	18.027500	69.58
##	646	2013-01-23	18.357500	69.49
##	647	2013-01-24	16.089287	69.79
##	648	2013-01-25	15.710000	69.00
##	649	2013-01-28	16.065357	69.35
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##	651	2013-01-30	16.315357	69.75
##	652	2013-01-31	16.267500	69.95
##	653	2013-02-01	16.200714	70.49
##	654	2013-02-04	15.797143	69.63
##	655	2013-02-05	16.351429	70.77
##	656	2013-02-06	16.333929	71.31
##	657	2013-02-07	16.722143	71.23
##	658	2013-02-08	16.963572	71.48
##	659	2013-02-11	17.140356	71.40
##	660	2013-02-12	16.710714	71.40
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##	662	2013-02-14	16.663929	70.82
##	663	2013-02-15	16.434286	69.30
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##	665	2013-02-20	16.030357	69.21
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##	667	2013-02-22	16.100357	70.40
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##	669	2013-02-26	16.034643	71.11
##	670	2013-02-27	15.877500	71.66
##	671	2013-02-28	15.764286	70.78
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##	675	2013-03-06	15.202143	73.38
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## 693	2013-04-02	15.349643	76.02
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## 696	2013-04-05	15.114286	76.39
## 697	2013-04-08	15.221786	77.29
## 698	2013-04-09	15.249286	78.12
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## 707	2013-04-22	14.238214	77.97
## 708	2013-04-23	14.504643	79.09
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## 718	2013-05-07	16.380714	78.83
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## 725	2013-05-16	15.520714	78.50
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## 727	2013-05-20	15.818929	77.40
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## 731	2013-05-24	15.898214	77.31
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##	779	2013-08-02	16.519285	78.75
##	780	2013-08-05	16.766071	78.77
##	781	2013-08-06	16.616072	77.87
##	782	2013-08-07	16.606428	77.37
##	783	2013-08-08	16.464643	77.25
##	784	2013-08-09	16.230356	76.90
##	785	2013-08-12	16.691429	77.08
##	786	2013-08-13	17.484644	76.86
##	787	2013-08-14	17.803572	76.40



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##	789	2013-08-16	17.940357	74.11
##	790	2013-08-19	18.133572	73.58
##	791	2013-08-20	17.895357	73.23
##	792	2013-08-21	17.941429	73.55
##	793	2013-08-22	17.962856	73.46
##	794	2013-08-23	17.893572	73.44
##	795	2013-08-26	17.963215	73.03
##	796	2013-08-27	17.449642	72.86
##	797	2013-08-28	17.532143	72.38
##	798	2013-08-29	17.560715	72.43
##	799	2013-08-30	17.400715	72.98
##	800	2013-09-03	17.449286	72.68
##	801	2013-09-04	17.810356	72.91
##	802	2013-09-05	17.688213	72.67
##	803	2013-09-06	17.793571	72.59
##	804	2013-09-09	18.077499	73.51
##	805	2013-09-10	17.665714	73.96
##	806	2013-09-11	16.703930	74.05
##	807	2013-09-12	16.881786	73.91
##	808	2013-09-13	16.603571	74.36
##	809	2013-09-16	16.075714	74.78
##	810	2013-09-17	16.261429	75.15
##	811	2013-09-18	16.595715	76.42
##	812	2013-09-19	16.867857	76.21
##	813	2013-09-20	16.693214	75.83
##	814	2013-09-23	17.522858	76.42
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##	816	2013-09-25	17.197500	74.65
##	817	2013-09-26	17.365000	74.62
##	818	2013-09-27	17.241072	74.36
##	819	2013-09-30	17.026787	73.96
##	820	2013-10-01	17.427143	73.59
##	821	2013-10-02	17.484285	73.72
##	822	2013-10-03	17.264643	73.16
##	823	2013-10-04	17.251072	72.80
##	824	2013-10-07	17.419643	71.87
##	825	2013-10-08	17.176430	72.90
##	826	2013-10-09	17.378214	73.00
##	827	2013-10-10	17.487143	74.79
##	828	2013-10-11	17.600357	74.82
##	829	2013-10-14	17.715714	74.68
##	830	2013-10-15	17.809999	74.37
##	831	2013-10-16	17.896786	75.60
##	832	2013-10-17	18.017857	75.78
##	833	2013-10-18	18.174643	75.71
##	834	2013-10-21	18.620001	75.15
##	835	2013-10-22	18.566786	76.32
##	836	2013-10-23	18.748571	75.90
##	837	2013-10-24	18.996786	76.42
##	838	2013-10-25	18.784286	76.08
##	839	2013-10-28	18.924286	77.14
##	840	2013-10-29	18.452856	77.06
##	841	2013-10-30	18.746429	76.91

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##	845	2013-11-05	18.766071	77.42
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##	847	2013-11-07	18.303213	77.51
##	848	2013-11-08	18.591429	77.96
##	849	2013-11-11	18.537500	79.01
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##	851	2013-11-13	18.593929	78.90
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##	853	2013-11-15	18.749643	79.22
##	854	2013-11-18	18.522499	79.22
##	855	2013-11-19	18.555357	79.25
##	856	2013-11-20	18.392857	78.90
##	857	2013-11-21	18.612143	78.86
##	858	2013-11-22	18.564285	79.81
##	859	2013-11-25	18.705000	80.43
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##	861	2013-11-27	19.498571	80.93
##	862	2013-11-29	19.859644	81.01
##	863	2013-12-02	19.686787	81.11
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##	867	2013-12-06	20.000713	79.94
##	868	2013-12-09	20.229643	79.95
##	869	2013-12-10	20.198214	79.08
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##	871	2013-12-12	20.019285	78.50
##	872	2013-12-13	19.801071	78.08
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##	876	2013-12-19	19.445000	77.24
##	877	2013-12-20	19.607857	77.43
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##	885	2014-01-03	19.320715	78.65
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##	889	2014-01-09	19.161428	78.09
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##	891	2014-01-13	19.133215	77.49
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##	894	2014-01-16	19.794643	76.76
##	895	2014-01-17	19.309643	76.19

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##	898	2014-01-23	19.863571	74.96
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##	919	2014-02-24	18.841070	73.35
##	920	2014-02-25	18.645000	73.35
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##	922	2014-02-27	18.845358	74.56
##	923	2014-02-28	18.794287	74.70
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##	973	2014-05-12	21.172501	79.15
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##	975	2014-05-14	21.209642	78.74
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##	977	2014-05-16	21.339643	77.01
##	978	2014-05-19	21.592501	76.61
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##	980	2014-05-21	21.653929	75.66
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##	984	2014-05-28	22.286072	75.53
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##	998	2014-06-17	23.020000	74.99
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##	1011	2014-07-07	23.992500	76.07
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##	1018	2014-07-16	23.695000	76.86
##	1019	2014-07-17	23.272499	76.61
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##	1124	2014-12-15	27.057501	83.94
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##	1171	2015-02-24	33.042500	84.57
##	1172	2015-02-25	32.197498	83.57
##	1173	2015-02-26	32.605000	83.80
##	1174	2015-02-27	32.115002	83.93
##	1175	2015-03-02	32.272499	83.96
##	1176	2015-03-03	32.340000	83.37
##	1177	2015-03-04	32.134998	82.58
##	1178	2015-03-05	31.602501	83.57
##	1179	2015-03-06	31.650000	82.59
##	1180	2015-03-09	31.785000	82.88
##	1181	2015-03-10	31.127501	82.07
##	1182	2015-03-11	30.559999	80.69
##	1183	2015-03-12	31.112499	81.90
##	1184	2015-03-13	30.897499	81.90
##	1185	2015-03-16	31.237499	83.29
##	1186	2015-03-17	31.760000	82.62
##	1187	2015-03-18	32.117500	82.53
##	1188	2015-03-19	31.875000	81.52
##	1189	2015-03-20	31.475000	83.24
##	1190	2015-03-23	31.802500	83.31
##	1191	2015-03-24	31.672501	83.05
##	1192	2015-03-25	30.844999	81.32
##	1193	2015-03-26	31.059999	81.89
##	1194	2015-03-27	30.812500	81.35
##	1195	2015-03-30	31.592501	82.53
##	1196	2015-03-31	31.107500	82.25
##	1197	2015-04-01	31.062500	80.71
##	1198	2015-04-02	31.330000	80.73
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##	1203	2015-04-10	31.775000	80.65
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##	1207	2015-04-16	31.542500	79.24
##	1208	2015-04-17	31.187500	77.88
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##	1219	2015-05-04	32.174999	79.18



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##	1552	2016-08-26	26.735001	71.14
##	1553	2016-08-29	26.705000	71.40
##	1554	2016-08-30	26.500000	71.31
##	1555	2016-08-31	26.525000	71.44
##	1556	2016-09-01	26.682501	72.84
##	1557	2016-09-02	26.932501	72.50
##	1558	2016-09-06	26.924999	73.00
##	1559	2016-09-07	27.090000	72.06
##	1560	2016-09-08	26.379999	71.83
##	1561	2016-09-09	25.782499	70.30
##	1562	2016-09-12	26.360001	71.94
##	1563	2016-09-13	26.987499	71.46
##	1564	2016-09-14	27.942499	71.52
##	1565	2016-09-15	28.892500	72.40
##	1566	2016-09-16	28.730000	72.87
##	1567	2016-09-19	28.395000	72.09
##	1568	2016-09-20	28.392500	71.97
##	1569	2016-09-21	28.387501	72.19
##	1570	2016-09-22	28.655001	72.27
##	1571	2016-09-23	28.177500	72.35
##	1572	2016-09-26	28.219999	71.62
##	1573	2016-09-27	28.272499	72.33
##	1574	2016-09-28	28.487499	71.79
##	1575	2016-09-29	28.045000	70.73
##	1576	2016-09-30	28.262501	72.12
##	1577	2016-10-03	28.129999	72.01
##	1578	2016-10-04	28.250000	71.75
##	1579	2016-10-05	28.262501	71.67
##	1580	2016-10-06	28.472500	69.36
##	1581	2016-10-07	28.514999	68.70
##	1582	2016-10-10	29.012501	67.98
##	1583	2016-10-11	29.075001	67.39
##	1584	2016-10-12	29.334999	67.46
##	1585	2016-10-13	29.245001	68.23
##	1586	2016-10-14	29.407499	68.45
##	1587	2016-10-17	29.387501	68.22
##	1588	2016-10-18	29.367500	68.87
##	1589	2016-10-19	29.280001	68.89
##	1590	2016-10-20	29.264999	68.73
##	1591	2016-10-21	29.150000	68.34
##	1592	2016-10-24	29.412500	69.19
##	1593	2016-10-25	29.562500	69.36
##	1594	2016-10-26	28.897499	69.59
##	1595	2016-10-27	28.620001	69.83
##	1596	2016-10-28	28.430000	69.99
##	1597	2016-10-31	28.385000	70.02

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##	1599	2016-11-02	27.897499	69.45
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##	1602	2016-11-07	27.602501	69.78
##	1603	2016-11-08	27.764999	69.79
##	1604	2016-11-09	27.719999	71.10
##	1605	2016-11-10	26.947500	71.39
##	1606	2016-11-11	27.107500	71.23
##	1607	2016-11-14	26.427500	70.49
##	1608	2016-11-15	26.777500	71.42
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##	1610	2016-11-17	27.487499	69.19
##	1611	2016-11-18	27.514999	68.54
##	1612	2016-11-21	27.932501	69.37
##	1613	2016-11-22	27.950001	70.12
##	1614	2016-11-23	27.807501	70.83
##	1615	2016-11-25	27.947500	71.23
##	1616	2016-11-28	27.892500	71.19
##	1617	2016-11-29	27.865000	71.37
##	1618	2016-11-30	27.629999	70.43
##	1619	2016-12-01	27.372499	70.67
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##	1621	2016-12-05	27.277500	69.94
##	1622	2016-12-06	27.487499	70.36
##	1623	2016-12-07	27.757500	70.60
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##	1626	2016-12-12	28.325001	71.67
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##	1628	2016-12-14	28.797501	71.34
##	1629	2016-12-15	28.955000	71.08
##	1630	2016-12-16	28.992500	70.98
##	1631	2016-12-19	29.160000	71.58
##	1632	2016-12-20	29.237499	71.82
##	1633	2016-12-21	29.264999	71.24
##	1634	2016-12-22	29.072500	69.59
##	1635	2016-12-23	29.129999	69.54
##	1636	2016-12-27	29.315001	69.70
##	1637	2016-12-28	29.190001	69.31
##	1638	2016-12-29	29.182501	69.26
##	1639	2016-12-30	28.955000	69.12
##	1640	2017-01-03	29.037500	68.66
##	1641	2017-01-04	29.004999	69.06
##	1642	2017-01-05	29.152500	69.21
##	1643	2017-01-06	29.477501	68.26
##	1644	2017-01-09	29.747499	68.71
##	1645	2017-01-10	29.777500	68.23
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##	1647	2017-01-12	29.812500	67.97
##	1648	2017-01-13	29.760000	67.13
##	1649	2017-01-17	30.000000	68.42
##	1650	2017-01-18	29.997499	68.11
##	1651	2017-01-19	29.945000	67.62



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##	1655	2017-01-25	30.469999	66.89
##	1656	2017-01-26	30.485001	66.73
##	1657	2017-01-27	30.487499	65.66
##	1658	2017-01-30	30.407499	66.42
##	1659	2017-01-31	30.337500	66.74
##	1660	2017-02-01	32.187500	66.23
##	1661	2017-02-02	32.132500	66.70
##	1662	2017-02-03	32.270000	66.50
##	1663	2017-02-06	32.572498	66.40
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##	1665	2017-02-08	33.009998	67.81
##	1666	2017-02-09	33.105000	69.08
##	1667	2017-02-10	33.029999	68.02
##	1668	2017-02-13	33.322498	67.77
##	1669	2017-02-14	33.755001	68.66
##	1670	2017-02-15	33.877499	68.69
##	1671	2017-02-16	33.837502	68.87
##	1672	2017-02-17	33.930000	69.37
##	1673	2017-02-21	34.174999	71.45
##	1674	2017-02-22	34.277500	71.71
##	1675	2017-02-23	34.132500	71.31
##	1676	2017-02-24	34.165001	72.39
##	1677	2017-02-27	34.232498	71.74
##	1678	2017-02-28	34.247501	70.93
##	1679	2017-03-01	34.947498	70.45
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##	1681	2017-03-03	34.945000	70.03
##	1682	2017-03-06	34.834999	69.88
##	1683	2017-03-07	34.880001	69.87
##	1684	2017-03-08	34.750000	69.80
##	1685	2017-03-09	34.669998	69.86
##	1686	2017-03-10	34.785000	70.10
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##	1690	2017-03-16	35.172501	70.44
##	1691	2017-03-17	34.997501	69.89
##	1692	2017-03-20	35.365002	69.98
##	1693	2017-03-21	34.959999	69.90
##	1694	2017-03-22	35.355000	70.25
##	1695	2017-03-23	35.230000	69.86
##	1696	2017-03-24	35.160000	69.61
##	1697	2017-03-27	35.220001	69.66
##	1698	2017-03-28	35.950001	70.32
##	1699	2017-03-29	36.029999	70.74
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##	1703	2017-04-04	36.192501	72.01
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##	1712	2017-04-18	35.299999	73.89
##	1713	2017-04-19	35.169998	74.07
##	1714	2017-04-20	35.610001	74.80
##	1715	2017-04-21	35.567501	74.94
##	1716	2017-04-24	35.910000	74.78
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##	1718	2017-04-26	35.919998	75.43
##	1719	2017-04-27	35.947498	75.44
##	1720	2017-04-28	35.912498	75.18
##	1721	2017-05-01	36.645000	75.23
##	1722	2017-05-02	36.877499	75.52
##	1723	2017-05-03	36.764999	75.76
##	1724	2017-05-04	36.632500	76.34
##	1725	2017-05-05	37.240002	76.50
##	1726	2017-05-08	38.252499	76.12
##	1727	2017-05-09	38.497501	76.72
##	1728	2017-05-10	38.314999	76.70
##	1729	2017-05-11	38.487499	76.13
##	1730	2017-05-12	39.025002	75.71
##	1731	2017-05-15	38.924999	76.29
##	1732	2017-05-16	38.867500	75.11
##	1733	2017-05-17	37.562500	75.12
##	1734	2017-05-18	38.134998	77.54
##	1735	2017-05-19	38.264999	78.77
##	1736	2017-05-22	38.497501	78.55
##	1737	2017-05-23	38.450001	78.49
##	1738	2017-05-24	38.334999	78.15
##	1739	2017-05-25	38.467499	78.31
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##	1741	2017-05-30	38.417500	78.15
##	1742	2017-05-31	38.189999	78.60
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##	1750	2017-06-12	36.355000	79.24
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##	1752	2017-06-14	36.290001	79.90
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##	1754	2017-06-16	35.567501	75.24
##	1755	2017-06-19	36.584999	75.50
##	1756	2017-06-20	36.252499	75.54
##	1757	2017-06-21	36.467499	76.24
##	1758	2017-06-22	36.407501	75.52
##	1759	2017-06-23	36.570000	74.84

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##	1763	2017-06-29	35.919998	75.93
##	1764	2017-06-30	36.005001	75.68
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##	1766	2017-07-05	36.022499	75.32
##	1767	2017-07-06	35.682499	75.47
##	1768	2017-07-07	36.044998	75.33
##	1769	2017-07-10	36.264999	73.23
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##	1771	2017-07-12	36.435001	73.94
##	1772	2017-07-13	36.942501	75.05
##	1773	2017-07-14	37.259998	76.34
##	1774	2017-07-17	37.389999	76.37
##	1775	2017-07-18	37.520000	76.20
##	1776	2017-07-19	37.755001	75.87
##	1777	2017-07-20	37.584999	76.02
##	1778	2017-07-21	37.567501	76.15
##	1779	2017-07-24	38.022499	76.89
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##	1784	2017-07-31	37.182499	79.99
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##	1789	2017-08-07	39.702499	81.28
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##	1792	2017-08-10	38.830002	80.66
##	1793	2017-08-11	39.369999	80.40
##	1794	2017-08-14	39.962502	80.70
##	1795	2017-08-15	40.400002	80.77
##	1796	2017-08-16	40.237499	80.98
##	1797	2017-08-17	39.465000	79.70
##	1798	2017-08-18	39.375000	79.31
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##	1808	2017-09-01	41.012501	78.37
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##	1815	2017-09-13	39.912498	79.86
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##	1817	2017-09-15	39.970001	80.38
##	1818	2017-09-18	39.667500	80.00
##	1819	2017-09-19	39.682499	80.05
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##	1822	2017-09-22	37.972500	79.53
##	1823	2017-09-25	37.637501	79.15
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##	1825	2017-09-27	38.557499	79.29
##	1826	2017-09-28	38.320000	78.95
##	1827	2017-09-29	38.529999	78.14
##	1828	2017-10-02	38.452499	78.45
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##	1836	2017-10-12	39.000000	86.10
##	1837	2017-10-13	39.247501	86.62
##	1838	2017-10-16	39.970001	85.74
##	1839	2017-10-17	40.117500	85.98
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##	1847	2017-10-27	40.762501	88.17
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##	1856	2017-11-09	43.970001	90.30
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##	1858	2017-11-13	43.492500	90.99
##	1859	2017-11-14	42.834999	91.09
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##	1862	2017-11-17	42.537498	97.47
##	1863	2017-11-20	42.494999	97.48
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##	1865	2017-11-22	43.740002	96.41
##	1866	2017-11-24	43.742500	96.62
##	1867	2017-11-27	43.522499	96.62

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##	1905	2018-01-23	44.259998	105.90
##	1906	2018-01-24	43.555000	105.79
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##	1908	2018-01-26	42.877499	108.39
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##	1911	2018-01-31	41.857498	106.60
##	1912	2018-02-01	41.945000	105.52
##	1913	2018-02-02	40.125000	104.48
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##	1915	2018-02-06	40.757500	100.90
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##	1917	2018-02-08	38.787498	100.02
##	1918	2018-02-09	39.102501	99.37
##	1919	2018-02-12	40.677502	99.55
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##	1921	2018-02-14	41.842499	101.70

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##	1927	2018-02-23	43.875000	92.89
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##	1930	2018-02-28	44.529999	90.01
##	1931	2018-03-01	43.750000	89.08
##	1932	2018-03-02	44.052502	88.77
##	1933	2018-03-05	44.205002	89.98
##	1934	2018-03-06	44.167500	89.06
##	1935	2018-03-07	43.757500	87.74
##	1936	2018-03-08	44.235001	87.92
##	1937	2018-03-09	44.994999	88.72
##	1938	2018-03-12	45.430000	88.07
##	1939	2018-03-13	44.992500	88.30
##	1940	2018-03-14	44.610001	87.67
##	1941	2018-03-15	44.662498	87.51
##	1942	2018-03-16	44.505001	89.17
##	1943	2018-03-19	43.825001	87.45
##	1944	2018-03-20	43.810001	87.95
##	1945	2018-03-21	42.817501	88.18
##	1946	2018-03-22	42.212502	87.14
##	1947	2018-03-23	41.235001	85.42
##	1948	2018-03-26	43.192501	87.50
##	1949	2018-03-27	42.084999	86.05
##	1950	2018-03-28	41.619999	87.77
##	1951	2018-03-29	41.945000	88.97
##	1952	2018-04-02	41.669998	85.55
##	1953	2018-04-03	42.097500	86.80
##	1954	2018-04-04	42.902500	87.22
##	1955	2018-04-05	43.200001	87.81
##	1956	2018-04-06	42.095001	86.69
##	1957	2018-04-09	42.512501	86.28
##	1958	2018-04-10	43.312500	86.45
##	1959	2018-04-11	43.110001	85.91
##	1960	2018-04-12	43.535000	85.43
##	1961	2018-04-13	43.682499	86.02
##	1962	2018-04-16	43.955002	86.84
##	1963	2018-04-17	44.560001	87.90
##	1964	2018-04-18	44.459999	87.57
##	1965	2018-04-19	43.200001	87.89
##	1966	2018-04-20	41.430000	86.98
##	1967	2018-04-23	41.310001	86.10
##	1968	2018-04-24	40.735001	86.53
##	1969	2018-04-25	40.912498	87.17
##	1970	2018-04-26	41.055000	87.94
##	1971	2018-04-27	40.580002	87.29
##	1972	2018-04-30	41.314999	88.46
##	1973	2018-05-01	42.275002	87.41
##	1974	2018-05-02	44.142502	86.34
##	1975	2018-05-03	44.222500	86.23

##	1976	2018-05-04	45.957500	87.53
##	1977	2018-05-07	46.290001	85.47
##	1978	2018-05-08	46.512501	85.74
##	1979	2018-05-09	46.840000	83.06
##	1980	2018-05-10	47.509998	82.69
##	1981	2018-05-11	47.147499	83.38
##	1982	2018-05-14	47.037498	84.39
##	1983	2018-05-15	46.610001	84.52
##	1984	2018-05-16	47.044998	86.13
##	1985	2018-05-17	46.747501	84.49
##	1986	2018-05-18	46.577499	83.64
##	1987	2018-05-21	46.907501	84.51
##	1988	2018-05-22	46.790001	83.37
##	1989	2018-05-23	47.090000	83.01
##	1990	2018-05-24	47.037498	82.85
##	1991	2018-05-25	47.145000	82.46
##	1992	2018-05-29	46.974998	82.40
##	1993	2018-05-30	46.875000	84.12
##	1994	2018-05-31	46.717499	82.54
##	1995	2018-06-01	47.560001	82.99
##	1996	2018-06-04	47.957500	85.42
##	1997	2018-06-05	48.327499	84.62
##	1998	2018-06-06	48.494999	84.56
##	1999	2018-06-07	48.365002	84.95
##	2000	2018-06-08	47.924999	84.36
##	2001	2018-06-11	47.807499	84.30
##	2002	2018-06-12	48.070000	84.10
##	2003	2018-06-13	47.674999	84.09
##	2004	2018-06-14	47.700001	83.79
##	2005	2018-06-15	47.209999	83.70
##	2006	2018-06-18	47.185001	83.00
##	2007	2018-06-19	46.422501	83.61
##	2008	2018-06-20	46.625000	83.61
##	2009	2018-06-21	46.365002	84.21
##	2010	2018-06-22	46.230000	84.82
##	2011	2018-06-25	45.542500	86.47
##	2012	2018-06-26	46.107498	85.98
##	2013	2018-06-27	46.040001	86.89
##	2014	2018-06-28	46.375000	85.86
##	2015	2018-06-29	46.277500	85.65
##	2016	2018-07-02	46.794998	84.00
##	2017	2018-07-03	45.980000	84.44
##	2018	2018-07-05	46.349998	84.57
##	2019	2018-07-06	46.992500	84.51
##	2020	2018-07-09	47.645000	85.93
##	2021	2018-07-10	47.587502	87.21
##	2022	2018-07-11	46.970001	86.53
##	2023	2018-07-12	47.757500	86.52
##	2024	2018-07-13	47.832500	87.70
##	2025	2018-07-16	47.727501	87.64
##	2026	2018-07-17	47.862499	88.19
##	2027	2018-07-18	47.599998	88.07
##	2028	2018-07-19	47.970001	87.72
##	2029	2018-07-20	47.860001	88.06

##	2030	2018-07-23	47.902500	87.63
##	2031	2018-07-24	48.250000	87.96
##	2032	2018-07-25	48.705002	87.90
##	2033	2018-07-26	48.552502	88.23
##	2034	2018-07-27	47.744999	88.13
##	2035	2018-07-30	47.477501	88.88
##	2036	2018-07-31	47.572498	89.23
##	2037	2018-08-01	50.375000	88.24
##	2038	2018-08-02	51.847500	88.76
##	2039	2018-08-03	51.997501	89.60
##	2040	2018-08-06	52.267502	89.67
##	2041	2018-08-07	51.777500	89.77
##	2042	2018-08-08	51.812500	90.05
##	2043	2018-08-09	52.220001	89.01
##	2044	2018-08-10	51.882500	90.18
##	2045	2018-08-13	52.217499	89.64
##	2046	2018-08-14	52.437500	90.85
##	2047	2018-08-15	52.560001	90.22
##	2048	2018-08-16	53.330002	98.64
##	2049	2018-08-17	54.395000	97.85
##	2050	2018-08-20	53.865002	96.00
##	2051	2018-08-21	53.759998	96.08
##	2052	2018-08-22	53.762501	95.67
##	2053	2018-08-23	53.872501	95.18
##	2054	2018-08-24	54.040001	94.95
##	2055	2018-08-27	54.485001	94.54
##	2056	2018-08-28	54.924999	96.07
##	2057	2018-08-29	55.744999	95.64
##	2058	2018-08-30	56.257500	96.10
##	2059	2018-08-31	56.907501	95.86
##	2060	2018-09-04	57.090000	95.36
##	2061	2018-09-05	56.717499	96.62
##	2062	2018-09-06	55.775002	96.45
##	2063	2018-09-07	55.325001	95.83
##	2064	2018-09-10	54.582500	96.90
##	2065	2018-09-11	55.962502	96.64
##	2066	2018-09-12	55.267502	95.97
##	2067	2018-09-13	56.602501	95.12
##	2068	2018-09-14	55.959999	94.59
##	2069	2018-09-17	54.470001	94.82
##	2070	2018-09-18	54.560001	95.43
##	2071	2018-09-19	54.592499	95.24
##	2072	2018-09-20	55.007500	95.75
##	2073	2018-09-21	54.415001	95.90
##	2074	2018-09-24	55.197498	94.92
##	2075	2018-09-25	55.547501	95.10
##	2076	2018-09-26	55.105000	94.59
##	2077	2018-09-27	56.237499	94.13
##	2078	2018-09-28	56.435001	93.91
##	2079	2018-10-01	56.814999	94.40
##	2080	2018-10-02	57.320000	95.15
##	2081	2018-10-03	58.017502	94.07
##	2082	2018-10-04	56.997501	94.21
##	2083	2018-10-05	56.072498	93.31



##	2084	2018-10-08	55.942501	94.69
##	2085	2018-10-09	56.717499	97.08
##	2086	2018-10-10	54.090000	95.76
##	2087	2018-10-11	53.612499	93.92
##	2088	2018-10-12	55.527500	94.81
##	2089	2018-10-15	54.340000	93.82
##	2090	2018-10-16	55.537498	95.81
##	2091	2018-10-17	55.297501	96.56
##	2092	2018-10-18	54.005001	96.17
##	2093	2018-10-19	54.827499	97.15
##	2094	2018-10-22	55.162498	97.14
##	2095	2018-10-23	55.682499	97.80
##	2096	2018-10-24	53.772499	97.56
##	2097	2018-10-25	54.950001	99.18
##	2098	2018-10-26	54.075001	98.94
##	2099	2018-10-29	53.060001	99.80
##	2100	2018-10-30	53.325001	102.42
##	2101	2018-10-31	54.715000	100.28
##	2102	2018-11-01	55.555000	100.58
##	2103	2018-11-02	51.869999	101.34
##	2104	2018-11-05	50.397499	102.91
##	2105	2018-11-06	50.942501	103.33
##	2106	2018-11-07	52.487499	104.32
##	2107	2018-11-08	52.122501	104.88
##	2108	2018-11-09	51.117500	105.56
##	2109	2018-11-12	48.542500	103.87
##	2110	2018-11-13	48.057499	102.94
##	2111	2018-11-14	46.700001	101.53
##	2112	2018-11-15	47.852501	99.54
##	2113	2018-11-16	48.382500	97.69
##	2114	2018-11-19	46.465000	96.78
##	2115	2018-11-20	44.244999	94.16
##	2116	2018-11-21	44.195000	94.17
##	2117	2018-11-23	43.072498	95.10
##	2118	2018-11-26	43.654999	95.15
##	2119	2018-11-27	43.560001	95.04
##	2120	2018-11-28	45.235001	97.46
##	2121	2018-11-29	44.887501	97.29
##	2122	2018-11-30	44.645000	97.65
##	2123	2018-12-03	46.205002	98.75
##	2124	2018-12-04	44.172501	95.81
##	2125	2018-12-06	43.680000	94.77
##	2126	2018-12-07	42.122501	93.19
##	2127	2018-12-10	42.400002	93.94
##	2128	2018-12-11	42.157501	93.85
##	2129	2018-12-12	42.275002	93.11
##	2130	2018-12-13	42.737499	92.96
##	2131	2018-12-14	41.369999	91.85
##	2132	2018-12-17	40.985001	90.77
##	2133	2018-12-18	41.517502	91.08
##	2134	2018-12-19	40.222500	90.55
##	2135	2018-12-20	39.207500	87.28
##	2136	2018-12-21	37.682499	87.13
##	2137	2018-12-24	36.707500	85.82

##	2138	2018-12-26	39.292500	90.41
##	2139	2018-12-27	39.037498	91.59
##	2140	2018-12-28	39.057499	92.13
##	2141	2018-12-31	39.435001	93.15
##	2142	2019-01-02	39.480000	93.34
##	2143	2019-01-03	35.547501	92.86
##	2144	2019-01-04	37.064999	93.44
##	2145	2019-01-07	36.982498	94.54
##	2146	2019-01-08	37.687500	95.20
##	2147	2019-01-09	38.327499	94.89
##	2148	2019-01-10	38.450001	94.96
##	2149	2019-01-11	38.072498	94.84
##	2150	2019-01-14	37.500000	94.95
##	2151	2019-01-15	38.267502	96.25
##	2152	2019-01-16	38.735001	96.35
##	2153	2019-01-17	38.965000	96.74
##	2154	2019-01-18	39.205002	97.73
##	2155	2019-01-22	38.325001	97.49
##	2156	2019-01-23	38.480000	98.71
##	2157	2019-01-24	38.174999	98.36
##	2158	2019-01-25	39.439999	96.94
##	2159	2019-01-28	39.075001	97.06
##	2160	2019-01-29	38.669998	96.71
##	2161	2019-01-30	41.312500	94.80
##	2162	2019-01-31	41.610001	95.83
##	2163	2019-02-01	41.630001	93.86
##	2164	2019-02-04	42.812500	94.77
##	2165	2019-02-05	43.544998	95.60
##	2166	2019-02-06	43.560001	95.64
##	2167	2019-02-07	42.735001	96.73
##	2168	2019-02-08	42.602501	95.58
##	2169	2019-02-11	42.357498	96.20
##	2170	2019-02-12	42.722500	96.97
##	2171	2019-02-13	42.544998	97.94
##	2172	2019-02-14	42.700001	98.52
##	2173	2019-02-15	42.605000	99.99
##	2174	2019-02-19	42.732498	102.20
##	2175	2019-02-20	43.007500	99.88
##	2176	2019-02-21	42.764999	99.39
##	2177	2019-02-22	43.242500	99.55
##	2178	2019-02-25	43.557499	99.12
##	2179	2019-02-26	43.582500	98.69
##	2180	2019-02-27	43.717499	98.11
##	2181	2019-02-28	43.287498	98.99
##	2182	2019-03-01	43.742500	97.93
##	2183	2019-03-04	43.962502	97.85
##	2184	2019-03-05	43.882500	98.34
##	2185	2019-03-06	43.630001	98.26
##	2186	2019-03-07	43.125000	97.45
##	2187	2019-03-08	43.227501	97.59
##	2188	2019-03-11	44.724998	98.48
##	2189	2019-03-12	45.227501	98.37
##	2190	2019-03-13	45.427502	99.03
##	2191	2019-03-14	45.932499	98.22

##	2192	2019-03-15	46.529999	98.42
##	2193	2019-03-18	47.005001	99.66
##	2194	2019-03-19	46.632500	99.85
##	2195	2019-03-20	47.040001	98.64
##	2196	2019-03-21	48.772499	99.06
##	2197	2019-03-22	47.762501	98.28
##	2198	2019-03-25	47.185001	98.17
##	2199	2019-03-26	46.697498	98.32
##	2200	2019-03-27	47.117500	97.21
##	2201	2019-03-28	47.180000	97.13
##	2202	2019-03-29	47.487499	97.53
##	2203	2019-04-01	47.810001	97.82
##	2204	2019-04-02	48.505001	96.94
##	2205	2019-04-03	48.837502	97.19
##	2206	2019-04-04	48.922501	98.11
##	2207	2019-04-05	49.250000	98.83
##	2208	2019-04-08	50.025002	99.23
##	2209	2019-04-09	49.875000	98.69
##	2210	2019-04-10	50.154999	99.60
##	2211	2019-04-11	49.737499	100.80
##	2212	2019-04-12	49.717499	101.56
##	2213	2019-04-15	49.807499	102.43
##	2214	2019-04-16	49.812500	102.93
##	2215	2019-04-17	50.782501	103.16
##	2216	2019-04-18	50.965000	103.18
##	2217	2019-04-22	51.132500	102.37
##	2218	2019-04-23	51.869999	103.07
##	2219	2019-04-24	51.790001	103.53
##	2220	2019-04-25	51.320000	103.52
##	2221	2019-04-26	51.075001	101.53
##	2222	2019-04-29	51.152500	101.56
##	2223	2019-04-30	50.167500	102.84
##	2224	2019-05-01	52.630001	101.36
##	2225	2019-05-02	52.287498	101.15
##	2226	2019-05-03	52.937500	102.08
##	2227	2019-05-06	52.119999	102.46
##	2228	2019-05-07	50.715000	101.30
##	2229	2019-05-08	50.724998	100.30
##	2230	2019-05-09	50.180000	99.54
##	2231	2019-05-10	49.294998	101.91
##	2232	2019-05-13	46.430000	99.89
##	2233	2019-05-14	47.165001	100.29
##	2234	2019-05-15	47.730000	99.88
##	2235	2019-05-16	47.520000	101.31
##	2236	2019-05-17	47.250000	100.86
##	2237	2019-05-20	45.772499	101.52
##	2238	2019-05-21	46.650002	101.12
##	2239	2019-05-22	45.695000	102.23
##	2240	2019-05-23	44.915001	101.86
##	2241	2019-05-24	44.742500	102.67
##	2242	2019-05-28	44.557499	102.42
##	2243	2019-05-29	44.345001	102.12
##	2244	2019-05-30	44.575001	102.19
##	2245	2019-05-31	43.767502	101.44

##	2246	2019-06-03	43.325001	101.96
##	2247	2019-06-04	44.910000	102.56
##	2248	2019-06-05	45.634998	104.42
##	2249	2019-06-06	46.305000	105.11
##	2250	2019-06-07	47.537498	106.06
##	2251	2019-06-10	48.145000	107.52
##	2252	2019-06-11	48.702499	107.94
##	2253	2019-06-12	48.547501	108.82
##	2254	2019-06-13	48.537498	108.65
##	2255	2019-06-14	48.185001	109.07
##	2256	2019-06-17	48.472500	109.16
##	2257	2019-06-18	49.612499	109.65
##	2258	2019-06-19	49.467499	109.62
##	2259	2019-06-20	49.865002	110.32
##	2260	2019-06-21	49.695000	111.13
##	2261	2019-06-24	49.645000	111.24
##	2262	2019-06-25	48.892502	110.72
##	2263	2019-06-26	49.950001	110.16
##	2264	2019-06-27	49.935001	110.10
##	2265	2019-06-28	49.480000	110.49
##	2266	2019-07-01	50.387501	110.62
##	2267	2019-07-02	50.682499	111.60
##	2268	2019-07-03	51.102501	112.32
##	2269	2019-07-05	51.057499	111.98
##	2270	2019-07-08	50.005001	112.72
##	2271	2019-07-09	50.310001	112.88
##	2272	2019-07-10	50.807499	112.98
##	2273	2019-07-11	50.437500	113.92
##	2274	2019-07-12	50.825001	114.60
##	2275	2019-07-15	51.302502	114.98
##	2276	2019-07-16	51.125000	114.76
##	2277	2019-07-17	50.837502	114.60
##	2278	2019-07-18	51.415001	114.72
##	2279	2019-07-19	50.647499	113.90
##	2280	2019-07-22	51.805000	112.82
##	2281	2019-07-23	52.209999	112.09
##	2282	2019-07-24	52.167500	112.00
##	2283	2019-07-25	51.755001	112.22
##	2284	2019-07-26	51.935001	113.02
##	2285	2019-07-29	52.419998	112.27
##	2286	2019-07-30	52.195000	112.06
##	2287	2019-07-31	53.259998	110.38
##	2288	2019-08-01	52.107498	109.38
##	2289	2019-08-02	51.005001	109.40
##	2290	2019-08-05	48.334999	105.82
##	2291	2019-08-06	49.250000	107.27
##	2292	2019-08-07	49.759998	108.20
##	2293	2019-08-08	50.857498	108.52
##	2294	2019-08-09	50.247501	107.28
##	2295	2019-08-12	50.119999	105.22
##	2296	2019-08-13	52.242500	107.41
##	2297	2019-08-14	50.687500	106.20
##	2298	2019-08-15	50.435001	112.69
##	2299	2019-08-16	51.625000	112.99

##	2300	2019-08-19	52.587502	113.81
##	2301	2019-08-20	52.590000	112.05
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##	2303	2019-08-22	53.115002	111.91
##	2304	2019-08-23	50.660000	110.83
##	2305	2019-08-26	51.622501	111.99
##	2306	2019-08-27	51.040001	112.42
##	2307	2019-08-28	51.382500	112.72
##	2308	2019-08-29	52.252499	114.08
##	2309	2019-08-30	52.185001	114.26
##	2310	2019-09-03	51.424999	114.64
##	2311	2019-09-04	52.297501	115.91
##	2312	2019-09-05	53.320000	115.44
##	2313	2019-09-06	53.314999	114.73
##	2314	2019-09-09	53.542500	116.33
##	2315	2019-09-10	54.174999	116.05
##	2316	2019-09-11	55.897499	116.02
##	2317	2019-09-12	55.772499	116.92
##	2318	2019-09-13	54.687500	117.43
##	2319	2019-09-16	54.974998	115.57
##	2320	2019-09-17	55.174999	116.51
##	2321	2019-09-18	55.692501	117.16
##	2322	2019-09-19	55.240002	117.11
##	2323	2019-09-20	54.432499	116.98
##	2324	2019-09-23	54.680000	117.62
##	2325	2019-09-24	54.419998	118.40
##	2326	2019-09-25	55.257500	118.47
##	2327	2019-09-26	54.972500	118.30
##	2328	2019-09-27	54.705002	118.45
##	2329	2019-09-30	55.992500	118.68
##	2330	2019-10-01	56.147499	117.85
##	2331	2019-10-02	54.740002	116.12
##	2332	2019-10-03	55.205002	116.31
##	2333	2019-10-04	56.752499	118.16
##	2334	2019-10-07	56.764999	117.23
##	2335	2019-10-08	56.099998	117.58
##	2336	2019-10-09	56.757500	118.93
##	2337	2019-10-10	57.522499	119.61
##	2338	2019-10-11	59.052502	120.24
##	2339	2019-10-14	58.967499	119.17
##	2340	2019-10-15	58.830002	119.53
##	2341	2019-10-16	58.592499	119.42
##	2342	2019-10-17	58.820000	119.84
##	2343	2019-10-18	59.102501	119.14
##	2344	2019-10-21	60.127499	119.74
##	2345	2019-10-22	59.990002	119.58
##	2346	2019-10-23	60.794998	119.35
##	2347	2019-10-24	60.895000	119.10
##	2348	2019-10-25	61.645000	119.04
##	2349	2019-10-28	62.262501	119.22
##	2350	2019-10-29	60.822498	117.15
##	2351	2019-10-30	60.814999	118.10
##	2352	2019-10-31	62.189999	117.26
##	2353	2019-11-01	63.955002	117.62

##	2354	2019-11-04	64.375000	117.57
##	2355	2019-11-05	64.282501	118.86
##	2356	2019-11-06	64.309998	119.50
##	2357	2019-11-07	64.857498	120.23
##	2358	2019-11-08	65.035004	119.44
##	2359	2019-11-11	65.550003	119.04
##	2360	2019-11-12	65.489998	119.12
##	2361	2019-11-13	66.117500	120.98
##	2362	2019-11-14	65.660004	120.65
##	2363	2019-11-15	66.440002	118.87
##	2364	2019-11-18	66.775002	120.25
##	2365	2019-11-19	66.572502	119.89
##	2366	2019-11-20	65.797501	119.13
##	2367	2019-11-21	65.502502	119.86
##	2368	2019-11-22	65.445000	119.36
##	2369	2019-11-25	66.592499	118.92
##	2370	2019-11-26	66.072502	119.19
##	2371	2019-11-27	66.959999	118.76
##	2372	2019-11-29	66.812500	119.09
##	2373	2019-12-02	66.040001	119.28
##	2374	2019-12-03	64.862503	118.67
##	2375	2019-12-04	65.434998	118.69
##	2376	2019-12-05	66.394997	118.66
##	2377	2019-12-06	67.677498	119.78
##	2378	2019-12-09	66.730003	119.36
##	2379	2019-12-10	67.120003	119.14
##	2380	2019-12-11	67.692497	119.00
##	2381	2019-12-12	67.864998	119.76
##	2382	2019-12-13	68.787498	120.29
##	2383	2019-12-16	69.964996	120.54
##	2384	2019-12-17	70.102501	121.28
##	2385	2019-12-18	69.934998	119.86
##	2386	2019-12-19	70.004997	120.08
##	2387	2019-12-20	69.860001	120.29
##	2388	2019-12-23	71.000000	119.03
##	2389	2019-12-24	71.067497	119.51
##	2390	2019-12-26	72.477501	119.52
##	2391	2019-12-27	72.449997	119.59
##	2392	2019-12-30	72.879997	119.40
##	2393	2019-12-31	73.412498	118.84
##	2394	2020-01-02	75.087502	118.94
##	2395	2020-01-03	74.357498	117.89
##	2396	2020-01-06	74.949997	117.65
##	2397	2020-01-07	74.597504	116.56
##	2398	2020-01-08	75.797501	116.16
##	2399	2020-01-09	77.407501	117.36
##	2400	2020-01-10	77.582497	116.38
##	2401	2020-01-13	79.239998	115.88
##	2402	2020-01-14	78.169998	116.18
##	2403	2020-01-15	77.834999	115.28
##	2404	2020-01-16	78.809998	115.90
##	2405	2020-01-17	79.682503	114.96
##	2406	2020-01-21	79.142502	115.59
##	2407	2020-01-22	79.425003	116.10

##	2408	2020-01-23	79.807503	115.81
##	2409	2020-01-24	79.577499	114.37
##	2410	2020-01-27	77.237503	115.86
##	2411	2020-01-28	79.422501	116.60
##	2412	2020-01-29	81.084999	115.89
##	2413	2020-01-30	80.967499	116.58
##	2414	2020-01-31	77.377502	114.49
##	2415	2020-02-03	77.165001	114.27
##	2416	2020-02-04	79.712502	115.27
##	2417	2020-02-05	80.362503	116.81
##	2418	2020-02-06	81.302498	116.31
##	2419	2020-02-07	80.007500	116.45
##	2420	2020-02-10	80.387497	115.25
##	2421	2020-02-11	79.902496	115.40
##	2422	2020-02-12	81.800003	115.85
##	2423	2020-02-13	81.217499	117.44
##	2424	2020-02-14	81.237503	117.89
##	2425	2020-02-18	79.750000	119.63
##	2426	2020-02-19	80.904999	117.68
##	2427	2020-02-20	80.074997	117.69
##	2428	2020-02-21	78.262497	118.58
##	2429	2020-02-24	74.544998	116.32
##	2430	2020-02-25	72.019997	114.39
##	2431	2020-02-26	73.162498	113.78
##	2432	2020-02-27	68.379997	110.40
##	2433	2020-02-28	68.339996	107.68
##	2434	2020-03-02	74.702499	115.88
##	2435	2020-03-03	72.330002	112.91
##	2436	2020-03-04	75.684998	116.77
##	2437	2020-03-05	73.230003	115.92
##	2438	2020-03-06	72.257500	117.23
##	2439	2020-03-09	66.542503	117.16
##	2440	2020-03-10	71.334999	119.79
##	2441	2020-03-11	68.857498	114.43
##	2442	2020-03-12	62.057499	104.05
##	2443	2020-03-13	69.492500	114.10
##	2444	2020-03-16	60.552502	106.76
##	2445	2020-03-17	63.215000	119.26
##	2446	2020-03-18	61.667500	122.58
##	2447	2020-03-19	61.195000	119.45
##	2448	2020-03-20	57.310001	113.97
##	2449	2020-03-23	56.092499	114.28
##	2450	2020-03-24	61.720001	115.03
##	2451	2020-03-25	61.380001	109.40
##	2452	2020-03-26	64.610001	109.82
##	2453	2020-03-27	61.935001	109.58
##	2454	2020-03-30	63.702499	115.19
##	2455	2020-03-31	63.572498	113.62
##	2456	2020-04-01	60.227501	114.14
##	2457	2020-04-02	61.232498	118.65
##	2458	2020-04-03	60.352501	119.48
##	2459	2020-04-06	65.617500	126.07
##	2460	2020-04-07	64.857498	121.99
##	2461	2020-04-08	66.517502	121.84

##	2462	2020-04-09	66.997498	121.80
##	2463	2020-04-13	68.312500	125.30
##	2464	2020-04-14	71.762497	129.00
##	2465	2020-04-15	71.107498	128.76
##	2466	2020-04-16	71.672501	132.33
##	2467	2020-04-17	70.699997	132.12
##	2468	2020-04-20	69.232498	129.85
##	2469	2020-04-21	67.092499	129.21
##	2470	2020-04-22	69.025002	131.59
##	2471	2020-04-23	68.757500	128.53
##	2472	2020-04-24	70.742500	129.44
##	2473	2020-04-27	70.792503	128.30
##	2474	2020-04-28	69.644997	128.00
##	2475	2020-04-29	71.932503	123.60
##	2476	2020-04-30	73.449997	121.55
##	2477	2020-05-01	72.267502	122.92
##	2478	2020-05-04	73.290001	123.70
##	2479	2020-05-05	74.389999	124.73
##	2480	2020-05-06	75.157501	123.30
##	2481	2020-05-07	75.934998	121.89
##	2482	2020-05-08	77.532501	122.94
##	2483	2020-05-11	78.752502	123.67
##	2484	2020-05-12	77.852501	123.78
##	2485	2020-05-13	76.912498	123.71
##	2486	2020-05-14	77.385002	123.42
##	2487	2020-05-15	76.927498	125.94
##	2488	2020-05-18	78.739998	127.66
##	2489	2020-05-19	78.285004	124.95
##	2490	2020-05-20	79.807503	125.45
##	2491	2020-05-21	79.212502	124.99
##	2492	2020-05-22	79.722504	124.33
##	2493	2020-05-26	79.182503	123.86
##	2494	2020-05-27	79.527496	122.48
##	2495	2020-05-28	79.562500	123.69
##	2496	2020-05-29	79.485001	124.06
##	2497	2020-06-01	80.462502	123.96
##	2498	2020-06-02	80.834999	123.94
##	2499	2020-06-03	81.279999	123.47
##	2500	2020-06-04	80.580002	122.11
##	2501	2020-06-05	82.875000	121.56
##	2502	2020-06-08	83.364998	121.24
##	2503	2020-06-09	85.997498	121.35
##	2504	2020-06-10	88.209999	121.16
##	2505	2020-06-11	83.974998	120.09
##	2506	2020-06-12	84.699997	117.74
##	2507	2020-06-15	85.747498	118.08
##	2508	2020-06-16	88.019997	119.65
##	2509	2020-06-17	87.897499	119.03
##	2510	2020-06-18	87.932503	117.99
##	2511	2020-06-19	87.430000	119.85
##	2512	2020-06-22	89.717499	121.68
##	2513	2020-06-23	91.632500	121.07
##	2514	2020-06-24	90.014999	120.30
##	2515	2020-06-25	91.209999	119.71



##	2516	2020-06-26	88.407501	118.32
##	2517	2020-06-29	90.445000	119.06
##	2518	2020-06-30	91.199997	119.78
##	2519	2020-07-01	91.027496	119.69
##	2520	2020-07-02	91.027496	119.21
##	2521	2020-07-06	93.462502	118.89
##	2522	2020-07-07	93.172501	126.95
##	2523	2020-07-08	95.342499	124.44
##	2524	2020-07-09	95.752502	127.75
##	2525	2020-07-10	95.919998	130.68
##	2526	2020-07-13	95.477501	129.52
##	2527	2020-07-14	97.057503	132.01
##	2528	2020-07-15	97.724998	132.00
##	2529	2020-07-16	96.522499	132.20
##	2530	2020-07-17	96.327499	131.74
##	2531	2020-07-20	98.357498	131.47
##	2532	2020-07-21	97.000000	132.33
##	2533	2020-07-22	97.272499	132.66
##	2534	2020-07-23	92.845001	131.64
##	2535	2020-07-24	92.614998	131.24
##	2536	2020-07-27	94.809998	131.21
##	2537	2020-07-28	93.252502	131.76
##	2538	2020-07-29	95.040001	130.69
##	2539	2020-07-30	96.190002	130.12
##	2540	2020-07-31	106.260002	129.40
##	2541	2020-08-03	108.937500	129.30
##	2542	2020-08-04	109.665001	131.64
##	2543	2020-08-05	110.062500	129.81
##	2544	2020-08-06	113.902496	129.35
##	2545	2020-08-07	111.112503	129.97
##	2546	2020-08-10	112.727501	131.88
##	2547	2020-08-11	109.375000	130.20
##	2548	2020-08-12	113.010002	131.89
##	2549	2020-08-13	115.010002	131.85
##	2550	2020-08-14	114.907501	132.60
##	2551	2020-08-17	114.607498	135.60
##	2552	2020-08-18	115.562500	134.71
##	2553	2020-08-19	115.707497	132.41
##	2554	2020-08-20	118.275002	130.57
##	2555	2020-08-21	124.370003	131.63
##	2556	2020-08-24	125.857498	131.33
##	2557	2020-08-25	124.824997	130.63
##	2558	2020-08-26	126.522499	130.70
##	2559	2020-08-27	125.010002	136.63
##	2560	2020-08-28	124.807503	140.30
##	2561	2020-08-31	129.039993	138.85
##	2562	2020-09-01	134.179993	147.59
##	2563	2020-09-02	131.399994	147.68
##	2564	2020-09-03	120.879997	144.54
##	2565	2020-09-04	120.959999	142.83
##	2566	2020-09-08	112.820000	138.45
##	2567	2020-09-09	117.320000	139.89
##	2568	2020-09-10	113.489998	136.81
##	2569	2020-09-11	112.000000	136.70

##	2570	2020-09-14	115.360001	137.32
##	2571	2020-09-15	115.540001	137.36
##	2572	2020-09-16	112.129997	136.26
##	2573	2020-09-17	110.339996	136.69
##	2574	2020-09-18	106.839996	135.29
##	2575	2020-09-21	110.080002	137.07
##	2576	2020-09-22	111.809998	138.31
##	2577	2020-09-23	107.120003	135.99
##	2578	2020-09-24	108.220001	136.70
##	2579	2020-09-25	112.279999	137.27
##	2580	2020-09-28	114.959999	137.25
##	2581	2020-09-29	114.089996	137.14
##	2582	2020-09-30	115.809998	139.91
##	2583	2020-10-01	116.790001	143.08
##	2584	2020-10-02	113.019997	140.50
##	2585	2020-10-05	116.500000	141.80
##	2586	2020-10-06	113.160004	140.63
##	2587	2020-10-07	115.080002	140.89
##	2588	2020-10-08	114.970001	141.36
##	2589	2020-10-09	116.970001	142.78
##	2590	2020-10-12	124.400002	144.25
##	2591	2020-10-13	121.099998	146.23
##	2592	2020-10-14	121.190002	143.94
##	2593	2020-10-15	120.709999	144.53
##	2594	2020-10-16	119.019997	144.71
##	2595	2020-10-19	115.980003	142.95
##	2596	2020-10-20	117.510002	143.90
##	2597	2020-10-21	116.870003	144.40
##	2598	2020-10-22	115.750000	143.55
##	2599	2020-10-23	115.040001	143.85
##	2600	2020-10-26	115.050003	142.16
##	2601	2020-10-27	116.599998	142.87
##	2602	2020-10-28	111.199997	140.04
##	2603	2020-10-29	115.320000	139.92
##	2604	2020-10-30	108.860001	138.75
##	2605	2020-11-02	108.769997	140.40
##	2606	2020-11-03	110.440002	142.78
##	2607	2020-11-04	114.949997	141.96
##	2608	2020-11-05	119.029999	143.47
##	2609	2020-11-06	118.690002	145.77
##	2610	2020-11-09	116.320000	143.54
##	2611	2020-11-10	115.970001	145.56
##	2612	2020-11-11	119.489998	147.98
##	2613	2020-11-12	119.209999	148.23
##	2614	2020-11-13	119.260002	150.54
##	2615	2020-11-16	120.300003	152.44
##	2616	2020-11-17	119.389999	149.37
##	2617	2020-11-18	118.029999	149.09
##	2618	2020-11-19	118.639999	152.12
##	2619	2020-11-20	117.339996	150.24
##	2620	2020-11-23	113.849998	150.93
##	2621	2020-11-24	115.169998	151.36
##	2622	2020-11-25	116.029999	151.83
##	2623	2020-11-27	116.589996	151.60

```
## 2624 2020-11-30 119.050003    152.79
## 2625 2020-12-01 122.720001    152.64
## 2626 2020-12-02 123.080002    150.52
## 2627 2020-12-03 122.940002    149.30
## 2628 2020-12-04 122.250000    148.91
## 2629 2020-12-07 123.750000    148.11
## 2630 2020-12-08 124.379997    149.45
## 2631 2020-12-09 121.779999    148.27
## 2632 2020-12-10 123.239998    147.04
## 2633 2020-12-11 122.410004    147.00
## 2634 2020-12-14 121.779999    145.65
## 2635 2020-12-15 127.879997    145.58
## 2636 2020-12-16 127.809998    145.43
## 2637 2020-12-17 128.699997    146.10
## 2638 2020-12-18 126.660004    145.95
```

```
summary(df)
```

```
##      AAPL.Date      AAPL.Close      WMT.Close
##  Min.   :2010-06-30 00:00:00.0  Min.    :  8.569  Min.    : 48.00
## 1st Qu.:2013-02-12 06:00:00.0 1st Qu.: 18.739 1st Qu.: 67.53
## Median :2015-09-24 12:00:00.0 Median : 27.526 Median : 75.53
## Mean   :2015-09-25 00:39:50.9 Mean   : 34.665 Mean   : 80.94
## 3rd Qu.:2018-05-08 18:00:00.0 3rd Qu.: 43.492 3rd Qu.: 90.53
## Max.   :2020-12-18 00:00:00.0 Max.    :134.180 Max.    :152.79
```

```
colnames(df) = c("DATE", "AAPL", "WMT")
attach(df)
```

```
## The following objects are masked _by_ .GlobalEnv:
```

```
##
```

```
##      AAPL, WMT
```

## Correlation

```
df_RD = df[,-1 ] # Except Date
df_RD
```

```
##      AAPL      WMT
## 1      8.983214 48.07
## 2      8.874286 48.34
## 3      8.819286 48.00
## 4      8.879643 48.57
## 5      9.238214 48.92
## 6      9.217500 49.18
## 7      9.272143 49.43
## 8      9.188929 50.12
## 9      8.992857 50.54
## 10     9.026071 50.35
## 11     8.980357 50.41
```

## 12	8.925000	49.67
## 13	8.770714	49.52
## 14	8.996071	50.88
## 15	9.080000	50.35
## 16	9.250714	50.86
## 17	9.283571	51.67
## 18	9.260000	51.13
## 19	9.431429	50.96
## 20	9.320000	51.13
## 21	9.218214	51.06
## 22	9.187500	51.19
## 23	9.351786	51.41
## 24	9.354643	51.29
## 25	9.392143	51.60
## 26	9.346429	51.62
## 27	9.288929	51.79
## 28	9.348214	52.06
## 29	9.264643	52.22
## 30	8.935357	51.02
## 31	8.992500	50.43
## 32	8.896429	50.40
## 33	8.844286	50.41
## 34	8.998929	51.02
## 35	9.038214	50.86
## 36	8.924286	50.06
## 37	8.915714	50.22
## 38	8.778571	51.14
## 39	8.568929	51.30
## 40	8.674643	51.55
## 41	8.581429	50.97
## 42	8.629286	51.00
## 43	8.660714	50.55
## 44	8.682143	50.14
## 45	8.940357	51.20
## 46	9.006071	51.76
## 47	9.241786	52.04
## 48	9.207500	51.86
## 49	9.390000	51.83
## 50	9.395357	51.91
## 51	9.407500	51.97
## 52	9.537143	52.21
## 53	9.573571	52.66
## 54	9.650714	52.86
## 55	9.877500	53.15
## 56	9.834643	53.01
## 57	10.115357	53.54
## 58	10.134643	53.57
## 59	10.276786	53.82
## 60	10.318571	53.65
## 61	10.440000	54.08
## 62	10.398571	53.48
## 63	10.245000	53.82
## 64	10.263214	53.35
## 65	10.133929	53.52

## 66	10.090000	53.36
## 67	9.951429	53.57
## 68	10.319286	54.00
## 69	10.328214	54.56
## 70	10.329286	54.36
## 71	10.502500	54.41
## 72	10.548571	54.61
## 73	10.662143	53.92
## 74	10.719286	53.82
## 75	10.796786	53.25
## 76	11.240714	53.35
## 77	11.357143	53.76
## 78	11.053214	53.32
## 79	11.090357	53.47
## 80	11.054286	54.03
## 81	10.981071	54.06
## 82	11.030000	53.95
## 83	11.001786	54.56
## 84	10.993929	53.87
## 85	10.901429	54.08
## 86	10.749286	54.17
## 87	10.863571	54.31
## 88	11.048571	54.79
## 89	11.171429	54.91
## 90	11.366786	55.36
## 91	11.326071	55.20
## 92	11.379286	54.91
## 93	11.288571	55.05
## 94	11.358214	54.51
## 95	11.308929	54.34
## 96	11.001071	54.13
## 97	10.965714	53.95
## 98	10.771071	54.26
## 99	10.732143	53.77
## 100	11.015357	53.98
## 101	10.954643	54.39
## 102	11.191429	54.38
## 103	11.026071	53.67
## 104	11.242857	54.01
## 105	11.250000	53.74
## 106	11.316786	53.85
## 107	11.112500	54.09
## 108	11.300000	54.70
## 109	11.362500	54.75
## 110	11.337143	54.62
## 111	11.433929	54.49
## 112	11.364643	55.09
## 113	11.464643	54.49
## 114	11.420000	54.34
## 115	11.448571	54.28
## 116	11.488214	54.21
## 117	11.438929	54.45
## 118	11.441429	54.23
## 119	11.473214	54.63

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## 121	11.507500	53.77
## 122	11.578571	53.65
## 123	11.612857	53.31
## 124	11.557143	53.60
## 125	11.595714	53.57
## 126	11.623929	53.74
## 127	11.617500	54.08
## 128	11.559286	54.07
## 129	11.520000	53.93
## 130	11.770357	54.56
## 131	11.831786	54.77
## 132	11.928571	54.41
## 133	11.918929	53.96
## 134	12.004286	54.08
## 135	12.230357	53.73
## 136	12.201429	54.29
## 137	12.300714	54.85
## 138	12.345714	54.79
## 139	12.445714	54.81
## 140	12.166071	55.14
## 141	12.101429	55.03
## 142	11.881429	55.99
## 143	11.668571	55.73
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## 145	12.192857	57.26
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## 147	12.257500	57.57
## 148	12.003571	56.70
## 149	12.118571	56.07
## 150	12.322500	56.33
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## 153	12.375000	56.03
## 154	12.567143	56.07
## 155	12.685714	56.38
## 156	12.791429	56.73
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## 161	12.968929	54.55
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## 163	12.520000	55.38
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## 165	12.236429	53.03
## 166	12.245714	52.09
## 167	12.434286	51.75
## 168	12.614643	51.98
## 169	12.475357	52.07
## 170	12.575714	51.97
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## 172	12.857143	52.07
## 173	12.691429	52.02

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## 178	12.627143	52.32
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## 180	11.786071	51.38
## 181	11.951429	51.37
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## 184	12.185714	52.00
## 185	12.113929	51.64
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## 188	12.515714	52.19
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## 190	12.451071	52.36
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## 206	12.525000	53.58
## 207	12.607500	53.37
## 208	12.515000	53.91
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## 210	12.383929	54.69
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## 213	12.435714	55.46
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## 216	12.380714	55.02
## 217	12.414286	55.10
## 218	12.480357	55.53
## 219	12.401071	55.17
## 220	12.377500	55.72
## 221	12.160714	55.72
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## 225	12.161786	55.48
## 226	11.972143	55.29
## 227	11.942857	55.22

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## 244	11.612857	52.83
## 245	11.437857	52.82
## 246	11.261429	53.04
## 247	11.617857	53.29
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## 254	11.988214	53.14
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## 256	12.479643	53.39
## 257	12.562857	53.72
## 258	12.757143	54.49
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## 260	12.642857	53.87
## 261	12.633929	53.94
## 262	12.786429	54.02
## 263	12.777500	53.63
## 264	13.032857	53.63
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## 266	13.458929	53.97
## 267	13.817857	53.89
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## 269	14.046429	54.52
## 270	14.232143	53.97
## 271	14.407500	53.59
## 272	14.021071	53.25
## 273	13.993571	52.99
## 274	13.945714	52.71
## 275	14.169643	52.62
## 276	13.889643	51.68
## 277	14.020357	51.28
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## 279	13.343571	50.85
## 280	12.614643	48.92
## 281	13.357500	50.82



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##	284	13.463929	49.75
##	285	13.693214	49.98
##	286	13.588571	51.92
##	287	13.587143	51.55
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##	290	12.730000	52.19
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##	294	13.699286	52.90
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##	297	13.743929	53.19
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##	301	13.711786	52.42
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##	304	13.569286	51.82
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##	307	14.034286	52.51
##	308	14.303571	52.65
##	309	14.701071	52.45
##	310	14.766071	52.29
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##	314	14.398929	51.83
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##	316	14.178929	51.31
##	317	13.948929	51.93
##	318	13.618571	51.90
##	319	13.378571	51.96
##	320	13.303571	52.88
##	321	13.508929	52.65
##	322	13.477500	52.75
##	323	13.207143	53.70
##	324	13.886071	54.81
##	325	14.296071	54.72
##	326	14.363929	55.20
##	327	14.586786	55.02
##	328	15.071429	55.46
##	329	14.999643	54.78
##	330	15.080000	55.89
##	331	14.236429	56.25
##	332	14.118214	56.37
##	333	14.031071	56.92
##	334	14.491786	56.78
##	335	14.206071	56.71

## 336	14.307143	57.37
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## 339	14.456429	56.72
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## 341	14.193214	56.86
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## 347	13.757857	58.13
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## 351	13.741786	56.68
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## 356	13.106786	56.64
## 357	12.984643	56.89
## 358	13.432857	57.25
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## 360	13.650000	58.90
## 361	13.854643	58.61
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## 363	14.036071	58.34
## 364	13.962500	58.78
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## 368	13.994286	58.09
## 369	13.886071	57.60
## 370	13.578214	57.65
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## 373	13.650357	57.78
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## 386	15.061786	59.18
## 387	15.115714	59.04
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## 389	15.049643	59.50

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## 409	17.622143	61.90
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## 435	21.641430	60.60
## 436	21.517857	60.56
## 437	21.405001	60.65
## 438	21.287500	60.75
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## 440	21.945715	61.09
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## 450	22.364286	59.80
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## 456	20.980000	61.75
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## 475	19.502857	59.19
## 476	18.932858	61.68
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## 494	20.434286	67.07
## 495	20.411785	67.63
## 496	20.504642	67.75
## 497	20.920713	68.12

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## 533	22.137857	74.31
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## 537	22.560356	74.01
## 538	22.529642	74.45
## 539	22.726429	72.15
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## 630	18.199642	67.61
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## 657	16.722143	71.23
## 658	16.963572	71.48
## 659	17.140356	71.40

## 660	16.710714	71.40
## 661	16.678928	71.39
## 662	16.663929	70.82
## 663	16.434286	69.30
## 664	16.428213	68.76
## 665	16.030357	69.21
## 666	15.930714	70.26
## 667	16.100357	70.40
## 668	15.814286	70.44
## 669	16.034643	71.11
## 670	15.877500	71.66
## 671	15.764286	70.78
## 672	15.373929	71.74
## 673	15.001786	73.26
## 674	15.397857	73.72
## 675	15.202143	73.38
## 676	15.377857	73.32
## 677	15.418571	73.03
## 678	15.638214	72.98
## 679	15.301071	73.60
## 680	15.298214	73.65
## 681	15.446429	73.22
## 682	15.845000	72.50
## 683	16.275715	72.25
## 684	16.231787	72.45
## 685	16.145714	72.99
## 686	16.168928	73.13
## 687	16.496786	74.28
## 688	16.556429	74.85
## 689	16.469286	74.77
## 690	16.145714	74.78
## 691	15.809286	74.83
## 692	15.318214	75.43
## 693	15.349643	76.02
## 694	15.428214	76.00
## 695	15.275714	76.20
## 696	15.114286	76.39
## 697	15.221786	77.29
## 698	15.249286	78.12
## 699	15.560357	77.37
## 700	15.511786	77.79
## 701	15.350000	78.56
## 702	14.994643	78.47
## 703	15.222857	78.68
## 704	14.385714	78.51
## 705	14.001786	77.16
## 706	13.947500	78.29
## 707	14.238214	77.97
## 708	14.504643	79.09
## 709	14.480714	78.03
## 710	14.585000	78.65
## 711	14.900000	79.04
## 712	15.361429	78.39
## 713	15.813571	77.72



## 714	15.688929	78.06
## 715	15.911429	78.46
## 716	16.070715	79.25
## 717	16.453930	78.83
## 718	16.380714	78.83
## 719	16.565714	78.25
## 720	16.313213	78.40
## 721	16.177500	78.89
## 722	16.240713	78.50
## 723	15.852143	78.78
## 724	15.316071	79.86
## 725	15.520714	78.50
## 726	15.473571	77.87
## 727	15.818929	77.40
## 728	15.702143	77.39
## 729	15.762500	77.03
## 730	15.790714	76.33
## 731	15.898214	77.31
## 732	15.765714	77.32
## 733	15.891071	76.23
## 734	16.127857	75.63
## 735	16.061787	74.84
## 736	16.097143	75.69
## 737	16.046785	75.94
## 738	15.896786	75.25
## 739	15.659286	75.63
## 740	15.778929	76.33
## 741	15.674643	75.75
## 742	15.628571	75.25
## 743	15.435357	74.84
## 744	15.570000	75.00
## 745	15.358929	74.87
## 746	15.428571	74.95
## 747	15.420357	75.73
## 748	15.107143	74.46
## 749	14.887143	73.03
## 750	14.767857	73.51
## 751	14.376429	74.20
## 752	14.379643	74.37
## 753	14.216786	75.01
## 754	14.063571	75.26
## 755	14.161786	74.49
## 756	14.615000	74.59
## 757	14.946071	74.71
## 758	15.028571	74.76
## 759	14.907857	75.21
## 760	14.823214	76.71
## 761	15.083929	77.03
## 762	15.026071	76.77
## 763	15.260357	77.63
## 764	15.232500	77.63
## 765	15.265714	77.03
## 766	15.364286	77.37
## 767	15.368214	77.20

## 768	15.420000	77.34
## 769	15.176786	78.08
## 770	15.225357	77.87
## 771	14.963929	78.55
## 772	15.732500	78.23
## 773	15.660714	78.01
## 774	15.749643	78.00
## 775	15.992500	77.99
## 776	16.190001	77.89
## 777	16.161785	77.94
## 778	16.309999	78.22
## 779	16.519285	78.75
## 780	16.766071	78.77
## 781	16.616072	77.87
## 782	16.606428	77.37
## 783	16.464643	77.25
## 784	16.230356	76.90
## 785	16.691429	77.08
## 786	17.484644	76.86
## 787	17.803572	76.40
## 788	17.782499	74.41
## 789	17.940357	74.11
## 790	18.133572	73.58
## 791	17.895357	73.23
## 792	17.941429	73.55
## 793	17.962856	73.46
## 794	17.893572	73.44
## 795	17.963215	73.03
## 796	17.449642	72.86
## 797	17.532143	72.38
## 798	17.560715	72.43
## 799	17.400715	72.98
## 800	17.449286	72.68
## 801	17.810356	72.91
## 802	17.688213	72.67
## 803	17.793571	72.59
## 804	18.077499	73.51
## 805	17.665714	73.96
## 806	16.703930	74.05
## 807	16.881786	73.91
## 808	16.603571	74.36
## 809	16.075714	74.78
## 810	16.261429	75.15
## 811	16.595715	76.42
## 812	16.867857	76.21
## 813	16.693214	75.83
## 814	17.522858	76.42
## 815	17.467857	75.75
## 816	17.197500	74.65
## 817	17.365000	74.62
## 818	17.241072	74.36
## 819	17.026787	73.96
## 820	17.427143	73.59
## 821	17.484285	73.72

## 822	17.264643	73.16
## 823	17.251072	72.80
## 824	17.419643	71.87
## 825	17.176430	72.90
## 826	17.378214	73.00
## 827	17.487143	74.79
## 828	17.600357	74.82
## 829	17.715714	74.68
## 830	17.809999	74.37
## 831	17.896786	75.60
## 832	18.017857	75.78
## 833	18.174643	75.71
## 834	18.620001	75.15
## 835	18.566786	76.32
## 836	18.748571	75.90
## 837	18.996786	76.42
## 838	18.784286	76.08
## 839	18.924286	77.14
## 840	18.452856	77.06
## 841	18.746429	76.91
## 842	18.667856	76.75
## 843	18.572500	77.07
## 844	18.812500	77.33
## 845	18.766071	77.42
## 846	18.604286	78.16
## 847	18.303213	77.51
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## 849	18.537500	79.01
## 850	18.571787	78.71
## 851	18.593929	78.90
## 852	18.862858	79.08
## 853	18.749643	79.22
## 854	18.522499	79.22
## 855	18.555357	79.25
## 856	18.392857	78.90
## 857	18.612143	78.86
## 858	18.564285	79.81
## 859	18.705000	80.43
## 860	19.049999	80.68
## 861	19.498571	80.93
## 862	19.859644	81.01
## 863	19.686787	81.11
## 864	20.225714	81.21
## 865	20.178572	80.22
## 866	20.282143	79.44
## 867	20.000713	79.94
## 868	20.229643	79.95
## 869	20.198214	79.08
## 870	20.048571	79.09
## 871	20.019285	78.50
## 872	19.801071	78.08
## 873	19.910713	77.74
## 874	19.821072	77.25
## 875	19.670357	77.94

## 876	19.445000	77.24
## 877	19.607857	77.43
## 878	20.360357	77.87
## 879	20.273930	78.01
## 880	20.139286	78.39
## 881	20.003214	78.47
## 882	19.804285	78.63
## 883	20.036428	78.69
## 884	19.754642	78.91
## 885	19.320715	78.65
## 886	19.426071	78.21
## 887	19.287144	78.45
## 888	19.409286	77.83
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## 890	19.033571	78.04
## 891	19.133215	77.49
## 892	19.513929	77.96
## 893	19.905714	77.66
## 894	19.794643	76.76
## 895	19.309643	76.19
## 896	19.609644	75.84
## 897	19.696787	75.35
## 898	19.863571	74.96
## 899	19.502501	74.42
## 900	19.660713	74.15
## 901	18.089287	74.67
## 902	17.883928	74.10
## 903	17.849285	74.75
## 904	17.878571	74.68
## 905	17.911785	72.66
## 906	18.171070	72.73
## 907	18.306786	72.87
## 908	18.303928	72.82
## 909	18.559999	73.75
## 910	18.892500	73.76
## 911	19.141430	74.80
## 912	19.139999	74.96
## 913	19.443930	75.36
## 914	19.428213	75.79
## 915	19.499643	75.33
## 916	19.191786	74.85
## 917	18.969643	73.52
## 918	18.758928	73.12
## 919	18.841070	73.35
## 920	18.645000	73.35
## 921	18.476786	74.78
## 922	18.845358	74.56
## 923	18.794287	74.70
## 924	18.848572	74.12
## 925	18.972857	75.13
## 926	19.012857	74.80
## 927	18.955357	74.88
## 928	18.944286	74.58
## 929	18.961430	74.43

## 930	19.146070	74.92
## 931	19.164642	75.53
## 932	18.951786	74.93
## 933	18.738930	74.28
## 934	18.812143	74.68
## 935	18.978571	74.77
## 936	18.973572	74.38
## 937	18.882143	75.38
## 938	19.031071	76.10
## 939	19.256786	76.76
## 940	19.463928	76.87
## 941	19.277857	76.23
## 942	19.195000	76.14
## 943	19.173571	76.01
## 944	19.169287	76.43
## 945	19.344643	76.77
## 946	19.376785	77.18
## 947	19.242500	77.46
## 948	18.993570	77.31
## 949	18.695356	77.31
## 950	18.694286	78.18
## 951	18.940001	77.97
## 952	18.695715	76.89
## 953	18.557501	76.50
## 954	18.631430	77.38
## 955	18.498571	76.88
## 956	18.536072	77.22
## 957	18.747856	77.66
## 958	18.970358	77.60
## 959	18.989286	77.56
## 960	18.741072	78.04
## 961	20.277500	78.31
## 962	20.426430	78.62
## 963	21.217501	79.76
## 964	21.154642	79.67
## 965	21.074642	79.71
## 966	21.124287	79.70
## 967	21.163570	79.12
## 968	21.462856	78.62
## 969	21.228930	78.01
## 970	21.154642	77.96
## 971	20.999643	78.69
## 972	20.912144	79.20
## 973	21.172501	79.15
## 974	21.205713	79.14
## 975	21.209642	78.74
## 976	21.029285	76.83
## 977	21.339643	77.01
## 978	21.592501	76.61
## 979	21.596786	75.69
## 980	21.653929	75.66
## 981	21.688213	75.39
## 982	21.933214	75.61
## 983	22.343929	75.59

## 984	22.286072	75.53
## 985	22.692142	75.98
## 986	22.607143	76.77
## 987	22.451786	76.76
## 988	22.769285	76.71
## 989	23.029285	77.13
## 990	23.119642	77.32
## 991	23.056070	77.21
## 992	23.424999	77.01
## 993	23.562500	76.62
## 994	23.465000	76.16
## 995	23.072500	75.73
## 996	22.820000	75.28
## 997	23.049999	75.34
## 998	23.020000	74.99
## 999	23.045000	75.70
## 1000	22.965000	75.87
## 1001	22.727501	75.68
## 1002	22.707500	75.79
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## 1005	22.725000	74.91
## 1006	22.995001	75.34
## 1007	23.232500	75.07
## 1008	23.379999	75.28
## 1009	23.370001	75.62
## 1010	23.507500	75.75
## 1011	23.992500	76.07
## 1012	23.837500	76.65
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## 1015	23.805000	76.82
## 1016	24.112499	76.55
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## 1018	23.695000	76.86
## 1019	23.272499	76.61
## 1020	23.607500	77.09
## 1021	23.485001	76.77
## 1022	23.680000	76.64
## 1023	24.297501	76.99
## 1024	24.257500	76.35
## 1025	24.417500	75.97
## 1026	24.754999	75.71
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## 1028	24.537500	74.78
## 1029	23.900000	73.58
## 1030	24.032499	73.54
## 1031	23.897499	73.54
## 1032	23.780001	73.34
## 1033	23.740000	74.20
## 1034	23.620001	73.95
## 1035	23.684999	74.67
## 1036	23.997499	74.36
## 1037	23.992500	74.22

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##	1041	24.790001	74.49
##	1042	25.132500	74.88
##	1043	25.142500	74.96
##	1044	25.145000	75.55
##	1045	25.330000	75.73
##	1046	25.385000	75.69
##	1047	25.222500	75.52
##	1048	25.532499	75.85
##	1049	25.562500	75.90
##	1050	25.625000	75.50
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##	1052	24.735001	76.01
##	1053	24.530001	76.56
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##	1055	24.590000	76.53
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##	1058	25.357500	76.10
##	1059	25.415001	75.77
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##	1062	25.395000	76.24
##	1063	25.447500	76.22
##	1064	25.240000	76.84
##	1065	25.264999	76.31
##	1066	25.660000	75.60
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##	1071	25.187500	76.47
##	1072	24.795000	76.12
##	1073	24.975000	76.23
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##	1076	24.687500	77.30
##	1077	25.200001	78.24
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##	1084	24.417500	74.10
##	1085	24.940001	75.14
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##	1087	25.747499	76.03
##	1088	26.207500	76.25
##	1089	26.305000	76.38
##	1090	26.277500	76.59
##	1091	26.684999	76.35

##	1092	26.834999	76.39
##	1093	26.745001	76.45
##	1094	27.000000	76.27
##	1095	27.350000	76.28
##	1096	27.150000	77.26
##	1097	27.215000	77.70
##	1098	27.174999	77.81
##	1099	27.252501	78.77
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##	1101	27.424999	79.01
##	1102	27.812500	79.20
##	1103	28.205000	82.94
##	1104	28.545000	82.96
##	1105	28.497499	83.57
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##	1118	28.750000	84.12
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##	1133	28.477501	86.64
##	1134	28.129999	86.79
##	1135	27.594999	85.88
##	1136	27.332500	85.90
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##	1143	27.555000	89.31
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##	1149	28.100000	88.30
##	1150	28.245001	88.51
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##	1152	27.285000	87.53
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##	1155	29.290001	84.98
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##	1157	29.662500	86.19
##	1158	29.889999	86.65
##	1159	29.985001	87.28
##	1160	29.732500	87.33
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##	1162	30.504999	87.29
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##	1166	31.957500	85.96
##	1167	32.180000	86.29
##	1168	32.112499	83.52
##	1169	32.375000	84.30
##	1170	33.250000	84.60
##	1171	33.042500	84.57
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##	1175	32.272499	83.96
##	1176	32.340000	83.37
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##	1179	31.650000	82.59
##	1180	31.785000	82.88
##	1181	31.127501	82.07
##	1182	30.559999	80.69
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##	1187	32.117500	82.53
##	1188	31.875000	81.52
##	1189	31.475000	83.24
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##	1192	30.844999	81.32
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##	1194	30.812500	81.35
##	1195	31.592501	82.53
##	1196	31.107500	82.25
##	1197	31.062500	80.71
##	1198	31.330000	80.73
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##	1208	31.187500	77.88
##	1209	31.900000	78.14
##	1210	31.727501	78.03
##	1211	32.154999	78.43
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##	1213	32.570000	79.84
##	1214	33.162498	79.37
##	1215	32.639999	79.10
##	1216	32.160000	77.88
##	1217	31.287500	78.05
##	1218	32.237499	78.60
##	1219	32.174999	79.18
##	1220	31.450001	78.13
##	1221	31.252501	77.65
##	1222	31.315001	78.03
##	1223	31.905001	78.53
##	1224	31.580000	78.10
##	1225	31.467501	78.96
##	1226	31.502501	78.16
##	1227	32.237499	78.72
##	1228	32.192501	79.24
##	1229	32.547501	79.92
##	1230	32.517502	76.43
##	1231	32.514999	75.90
##	1232	32.847500	76.11
##	1233	33.134998	75.86
##	1234	32.404999	74.90
##	1235	33.009998	75.19
##	1236	32.945000	74.84
##	1237	32.570000	74.27
##	1238	32.634998	74.73
##	1239	32.490002	74.53
##	1240	32.529999	74.89
##	1241	32.340000	74.15
##	1242	32.162498	73.06
##	1243	31.950001	72.61
##	1244	31.855000	72.47
##	1245	32.220001	72.93
##	1246	32.147499	72.94
##	1247	31.792500	72.43
##	1248	31.730000	71.93
##	1249	31.900000	72.35
##	1250	31.825001	72.73
##	1251	31.969999	72.98
##	1252	31.650000	72.74
##	1253	31.902500	72.79

##	1254	31.757500	72.57
##	1255	32.027500	72.38
##	1256	31.875000	71.86
##	1257	31.687500	72.12
##	1258	31.132500	71.42
##	1259	31.357500	70.93
##	1260	31.650000	71.88
##	1261	31.610001	71.86
##	1262	31.500000	72.53
##	1263	31.422501	73.79
##	1264	30.642500	73.06
##	1265	30.017500	72.78
##	1266	30.820000	73.12
##	1267	31.415001	73.88
##	1268	31.402500	73.79
##	1269	31.705000	73.65
##	1270	32.127499	73.83
##	1271	32.404999	73.39
##	1272	33.017502	73.10
##	1273	32.687500	72.74
##	1274	31.305000	73.16
##	1275	31.290001	72.51
##	1276	31.125000	71.58
##	1277	30.692499	71.38
##	1278	30.844999	72.10
##	1279	30.747499	72.23
##	1280	30.592501	72.16
##	1281	30.325001	71.98
##	1282	29.610001	72.18
##	1283	28.660000	72.25
##	1284	28.850000	73.51
##	1285	28.782499	72.79
##	1286	28.879999	71.25
##	1287	29.930000	71.48
##	1288	28.372499	71.93
##	1289	28.809999	72.58
##	1290	28.787500	72.11
##	1291	28.990000	72.38
##	1292	29.290001	71.91
##	1293	29.125000	69.48
##	1294	28.752501	68.57
##	1295	28.162500	68.43
##	1296	26.440001	66.54
##	1297	25.780001	63.95
##	1298	25.934999	63.10
##	1299	27.422501	64.83
##	1300	28.230000	66.08
##	1301	28.322500	64.94
##	1302	28.190001	64.73
##	1303	26.930000	63.82
##	1304	28.084999	64.44
##	1305	27.592501	64.86
##	1306	27.317499	63.89
##	1307	28.077499	66.38

##	1308	27.537500	65.12
##	1309	28.142500	64.12
##	1310	28.552500	64.65
##	1311	28.827499	64.28
##	1312	29.070000	64.32
##	1313	29.102501	64.69
##	1314	28.480000	64.47
##	1315	28.362499	63.34
##	1316	28.802500	63.72
##	1317	28.350000	63.59
##	1318	28.580000	63.72
##	1319	28.750000	63.83
##	1320	28.677500	63.78
##	1321	28.110001	63.66
##	1322	27.264999	63.78
##	1323	27.575001	64.84
##	1324	27.395000	64.27
##	1325	27.594999	64.98
##	1326	27.695000	65.87
##	1327	27.827499	65.68
##	1328	27.695000	66.36
##	1329	27.375000	66.88
##	1330	28.030001	66.69
##	1331	27.900000	66.93
##	1332	27.947500	66.73
##	1333	27.552500	60.03
##	1334	27.965000	59.33
##	1335	27.760000	58.89
##	1336	27.932501	58.85
##	1337	28.442499	58.75
##	1338	28.440001	58.64
##	1339	28.875000	58.90
##	1340	29.770000	58.30
##	1341	28.820000	58.02
##	1342	28.637501	57.48
##	1343	29.817499	57.64
##	1344	30.132500	57.96
##	1345	29.875000	57.24
##	1346	30.295000	57.61
##	1347	30.642500	58.11
##	1348	30.500000	58.37
##	1349	30.230000	58.61
##	1350	30.264999	58.78
##	1351	30.142500	58.49
##	1352	29.192499	58.68
##	1353	29.027500	57.58
##	1354	28.930000	56.95
##	1355	28.084999	56.42
##	1356	28.545000	57.87
##	1357	28.422501	59.92
##	1358	29.322500	60.93
##	1359	29.695000	60.70
##	1360	29.825001	60.07
##	1361	29.437500	60.26

##	1362	29.719999	59.92
##	1363	29.507500	60.24
##	1364	29.452499	59.89
##	1365	29.575001	58.84
##	1366	29.334999	58.99
##	1367	29.070000	58.35
##	1368	28.799999	59.04
##	1369	29.757500	59.66
##	1370	29.570000	60.50
##	1371	29.557501	59.61
##	1372	28.905001	59.13
##	1373	29.042500	59.56
##	1374	28.295000	59.36
##	1375	28.120001	60.39
##	1376	27.622499	59.64
##	1377	27.834999	60.30
##	1378	27.245001	58.98
##	1379	26.507500	58.85
##	1380	26.832500	59.55
##	1381	26.807501	60.54
##	1382	27.152500	61.09
##	1383	27.007500	60.83
##	1384	26.705000	60.75
##	1385	27.184999	61.61
##	1386	26.830000	61.68
##	1387	26.315001	61.30
##	1388	26.337500	61.46
##	1389	25.677500	62.92
##	1390	25.174999	63.55
##	1391	24.112499	65.03
##	1392	24.240000	63.54
##	1393	24.632500	64.22
##	1394	24.990000	63.62
##	1395	24.347500	61.92
##	1396	24.879999	63.06
##	1397	24.282499	61.93
##	1398	24.165001	62.56
##	1399	24.197500	60.84
##	1400	24.075001	61.88
##	1401	25.355000	62.69
##	1402	24.860001	63.45
##	1403	24.997499	64.00
##	1404	23.355000	63.95
##	1405	23.522499	64.22
##	1406	24.334999	66.36
##	1407	24.107500	67.50
##	1408	23.620001	66.86
##	1409	24.087500	66.27
##	1410	24.150000	66.42
##	1411	23.504999	67.00
##	1412	23.752501	66.90
##	1413	23.747499	65.81
##	1414	23.567499	65.79
##	1415	23.424999	65.32

##	1416	23.497499	66.18
##	1417	24.160000	65.90
##	1418	24.530001	66.11
##	1419	24.065001	64.12
##	1420	24.010000	64.66
##	1421	24.219999	65.63
##	1422	23.672501	66.48
##	1423	24.025000	67.12
##	1424	24.190001	68.04
##	1425	24.227501	66.51
##	1426	24.172501	66.34
##	1427	25.132500	66.46
##	1428	25.187500	66.21
##	1429	25.375000	66.14
##	1430	25.752501	66.78
##	1431	25.467501	67.89
##	1432	25.257500	68.04
##	1433	25.280001	67.53
##	1434	25.292500	67.41
##	1435	25.565001	67.17
##	1436	25.629999	67.36
##	1437	26.145000	68.09
##	1438	26.492500	67.99
##	1439	26.450001	67.45
##	1440	26.480000	66.95
##	1441	26.477501	67.97
##	1442	26.680000	67.87
##	1443	26.532499	67.46
##	1444	26.417500	68.00
##	1445	26.297501	68.12
##	1446	26.920000	68.03
##	1447	27.389999	68.80
##	1448	27.247499	68.49
##	1449	27.497499	69.06
##	1450	27.780001	69.10
##	1451	27.452499	68.64
##	1452	27.740000	69.04
##	1453	27.135000	68.22
##	1454	27.165001	68.06
##	1455	27.254999	67.40
##	1456	27.610001	68.80
##	1457	28.010000	69.15
##	1458	28.025000	68.80
##	1459	27.462500	69.06
##	1460	26.870001	69.86
##	1461	26.727501	69.77
##	1462	26.782499	69.21
##	1463	26.492500	68.47
##	1464	26.420000	68.72
##	1465	26.270000	69.47
##	1466	26.087500	69.30
##	1467	24.455000	69.42
##	1468	23.707500	68.91
##	1469	23.434999	66.87

##	1470	23.410000	67.59
##	1471	23.795000	67.00
##	1472	23.547501	67.19
##	1473	23.309999	67.21
##	1474	23.180000	68.25
##	1475	23.197500	68.95
##	1476	23.355000	68.79
##	1477	23.127501	66.41
##	1478	22.584999	66.85
##	1479	22.629999	64.94
##	1480	23.469999	66.02
##	1481	23.372499	65.10
##	1482	23.639999	63.15
##	1483	23.549999	69.20
##	1484	23.805000	69.86
##	1485	24.107500	69.50
##	1486	24.475000	70.24
##	1487	24.905001	70.48
##	1488	25.102501	70.85
##	1489	25.087500	70.75
##	1490	24.965000	70.78
##	1491	24.615000	70.50
##	1492	24.430000	70.95
##	1493	24.480000	70.87
##	1494	24.657499	71.05
##	1495	24.757500	71.03
##	1496	24.735001	71.28
##	1497	24.912500	71.09
##	1498	24.707500	71.14
##	1499	24.334999	70.53
##	1500	24.365000	70.95
##	1501	24.285000	71.12
##	1502	24.387501	71.30
##	1503	23.832500	70.95
##	1504	23.775000	71.10
##	1505	23.977501	71.46
##	1506	23.887501	71.75
##	1507	24.025000	72.10
##	1508	23.350000	71.96
##	1509	23.010000	71.50
##	1510	23.397499	71.51
##	1511	23.600000	72.46
##	1512	23.900000	73.02
##	1513	23.972500	72.81
##	1514	23.747499	73.14
##	1515	23.882500	73.82
##	1516	23.985001	73.53
##	1517	24.170000	73.84
##	1518	24.245001	74.06
##	1519	24.355000	73.27
##	1520	24.217501	73.62
##	1521	24.697500	73.70
##	1522	24.695000	73.67
##	1523	24.957500	73.84

##	1524	24.967501	73.66
##	1525	24.990000	73.79
##	1526	24.857500	73.52
##	1527	24.665001	73.55
##	1528	24.334999	73.75
##	1529	24.167500	73.73
##	1530	25.737499	73.32
##	1531	26.084999	73.24
##	1532	26.052500	72.97
##	1533	26.512501	73.78
##	1534	26.120001	73.13
##	1535	26.447500	72.94
##	1536	26.467501	73.30
##	1537	26.870001	73.76
##	1538	27.092501	73.34
##	1539	27.202499	73.54
##	1540	27.000000	73.95
##	1541	26.982500	73.80
##	1542	27.045000	73.89
##	1543	27.370001	73.32
##	1544	27.344999	72.89
##	1545	27.305000	72.93
##	1546	27.270000	74.30
##	1547	27.340000	72.81
##	1548	27.127501	72.70
##	1549	27.212500	71.97
##	1550	27.007500	72.23
##	1551	26.892500	71.22
##	1552	26.735001	71.14
##	1553	26.705000	71.40
##	1554	26.500000	71.31
##	1555	26.525000	71.44
##	1556	26.682501	72.84
##	1557	26.932501	72.50
##	1558	26.924999	73.00
##	1559	27.090000	72.06
##	1560	26.379999	71.83
##	1561	25.782499	70.30
##	1562	26.360001	71.94
##	1563	26.987499	71.46
##	1564	27.942499	71.52
##	1565	28.892500	72.40
##	1566	28.730000	72.87
##	1567	28.395000	72.09
##	1568	28.392500	71.97
##	1569	28.387501	72.19
##	1570	28.655001	72.27
##	1571	28.177500	72.35
##	1572	28.219999	71.62
##	1573	28.272499	72.33
##	1574	28.487499	71.79
##	1575	28.045000	70.73
##	1576	28.262501	72.12
##	1577	28.129999	72.01



##	1578	28.250000	71.75
##	1579	28.262501	71.67
##	1580	28.472500	69.36
##	1581	28.514999	68.70
##	1582	29.012501	67.98
##	1583	29.075001	67.39
##	1584	29.334999	67.46
##	1585	29.245001	68.23
##	1586	29.407499	68.45
##	1587	29.387501	68.22
##	1588	29.367500	68.87
##	1589	29.280001	68.89
##	1590	29.264999	68.73
##	1591	29.150000	68.34
##	1592	29.412500	69.19
##	1593	29.562500	69.36
##	1594	28.897499	69.59
##	1595	28.620001	69.83
##	1596	28.430000	69.99
##	1597	28.385000	70.02
##	1598	27.872499	69.30
##	1599	27.897499	69.45
##	1600	27.457500	69.63
##	1601	27.209999	69.16
##	1602	27.602501	69.78
##	1603	27.764999	69.79
##	1604	27.719999	71.10
##	1605	26.947500	71.39
##	1606	27.107500	71.23
##	1607	26.427500	70.49
##	1608	26.777500	71.42
##	1609	27.497499	71.39
##	1610	27.487499	69.19
##	1611	27.514999	68.54
##	1612	27.932501	69.37
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##	1614	27.807501	70.83
##	1615	27.947500	71.23
##	1616	27.892500	71.19
##	1617	27.865000	71.37
##	1618	27.629999	70.43
##	1619	27.372499	70.67
##	1620	27.475000	70.88
##	1621	27.277500	69.94
##	1622	27.487499	70.36
##	1623	27.757500	70.60
##	1624	28.030001	70.34
##	1625	28.487499	70.08
##	1626	28.325001	71.67
##	1627	28.797501	71.80
##	1628	28.797501	71.34
##	1629	28.955000	71.08
##	1630	28.992500	70.98
##	1631	29.160000	71.58

##	1632	29.237499	71.82
##	1633	29.264999	71.24
##	1634	29.072500	69.59
##	1635	29.129999	69.54
##	1636	29.315001	69.70
##	1637	29.190001	69.31
##	1638	29.182501	69.26
##	1639	28.955000	69.12
##	1640	29.037500	68.66
##	1641	29.004999	69.06
##	1642	29.152500	69.21
##	1643	29.477501	68.26
##	1644	29.747499	68.71
##	1645	29.777500	68.23
##	1646	29.937500	68.53
##	1647	29.812500	67.97
##	1648	29.760000	67.13
##	1649	30.000000	68.42
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##	1652	30.000000	67.18
##	1653	30.020000	66.65
##	1654	29.992500	67.40
##	1655	30.469999	66.89
##	1656	30.485001	66.73
##	1657	30.487499	65.66
##	1658	30.407499	66.42
##	1659	30.337500	66.74
##	1660	32.187500	66.23
##	1661	32.132500	66.70
##	1662	32.270000	66.50
##	1663	32.572498	66.40
##	1664	32.882500	66.89
##	1665	33.009998	67.81
##	1666	33.105000	69.08
##	1667	33.029999	68.02
##	1668	33.322498	67.77
##	1669	33.755001	68.66
##	1670	33.877499	68.69
##	1671	33.837502	68.87
##	1672	33.930000	69.37
##	1673	34.174999	71.45
##	1674	34.277500	71.71
##	1675	34.132500	71.31
##	1676	34.165001	72.39
##	1677	34.232498	71.74
##	1678	34.247501	70.93
##	1679	34.947498	70.45
##	1680	34.740002	70.76
##	1681	34.945000	70.03
##	1682	34.834999	69.88
##	1683	34.880001	69.87
##	1684	34.750000	69.80
##	1685	34.669998	69.86

##	1686	34.785000	70.10
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##	1688	34.747501	70.72
##	1689	35.115002	70.58
##	1690	35.172501	70.44
##	1691	34.997501	69.89
##	1692	35.365002	69.98
##	1693	34.959999	69.90
##	1694	35.355000	70.25
##	1695	35.230000	69.86
##	1696	35.160000	69.61
##	1697	35.220001	69.66
##	1698	35.950001	70.32
##	1699	36.029999	70.74
##	1700	35.982498	71.59
##	1701	35.915001	72.08
##	1702	35.924999	71.83
##	1703	36.192501	72.01
##	1704	36.005001	71.65
##	1705	35.915001	71.43
##	1706	35.834999	72.90
##	1707	35.792500	73.06
##	1708	35.407501	73.43
##	1709	35.450001	73.44
##	1710	35.262501	73.15
##	1711	35.457500	73.49
##	1712	35.299999	73.89
##	1713	35.169998	74.07
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##	1715	35.567501	74.94
##	1716	35.910000	74.78
##	1717	36.132500	75.05
##	1718	35.919998	75.43
##	1719	35.947498	75.44
##	1720	35.912498	75.18
##	1721	36.645000	75.23
##	1722	36.877499	75.52
##	1723	36.764999	75.76
##	1724	36.632500	76.34
##	1725	37.240002	76.50
##	1726	38.252499	76.12
##	1727	38.497501	76.72
##	1728	38.314999	76.70
##	1729	38.487499	76.13
##	1730	39.025002	75.71
##	1731	38.924999	76.29
##	1732	38.867500	75.11
##	1733	37.562500	75.12
##	1734	38.134998	77.54
##	1735	38.264999	78.77
##	1736	38.497501	78.55
##	1737	38.450001	78.49
##	1738	38.334999	78.15
##	1739	38.467499	78.31

##	1740	38.402500	78.13
##	1741	38.417500	78.15
##	1742	38.189999	78.60
##	1743	38.294998	79.81
##	1744	38.862499	79.62
##	1745	38.482498	80.26
##	1746	38.612499	78.93
##	1747	38.842499	79.15
##	1748	38.747501	78.93
##	1749	37.244999	79.42
##	1750	36.355000	79.24
##	1751	36.647499	79.52
##	1752	36.290001	79.90
##	1753	36.072498	78.91
##	1754	35.567501	75.24
##	1755	36.584999	75.50
##	1756	36.252499	75.54
##	1757	36.467499	76.24
##	1758	36.407501	75.52
##	1759	36.570000	74.84
##	1760	36.455002	75.50
##	1761	35.932499	76.01
##	1762	36.457500	76.51
##	1763	35.919998	75.93
##	1764	36.005001	75.68
##	1765	35.875000	75.36
##	1766	36.022499	75.32
##	1767	35.682499	75.47
##	1768	36.044998	75.33
##	1769	36.264999	73.23
##	1770	36.382500	73.47
##	1771	36.435001	73.94
##	1772	36.942501	75.05
##	1773	37.259998	76.34
##	1774	37.389999	76.37
##	1775	37.520000	76.20
##	1776	37.755001	75.87
##	1777	37.584999	76.02
##	1778	37.567501	76.15
##	1779	38.022499	76.89
##	1780	38.185001	78.52
##	1781	38.365002	78.90
##	1782	37.639999	79.78
##	1783	37.375000	79.81
##	1784	37.182499	79.99
##	1785	37.512501	80.50
##	1786	39.285000	80.53
##	1787	38.892502	80.87
##	1788	39.097500	80.48
##	1789	39.702499	81.28
##	1790	40.020000	81.59
##	1791	40.264999	81.61
##	1792	38.830002	80.66
##	1793	39.369999	80.40

##	1794	39.962502	80.70
##	1795	40.400002	80.77
##	1796	40.237499	80.98
##	1797	39.465000	79.70
##	1798	39.375000	79.31
##	1799	39.302502	79.71
##	1800	39.945000	80.02
##	1801	39.994999	79.96
##	1802	39.817501	78.34
##	1803	39.965000	78.63
##	1804	40.367500	78.03
##	1805	40.727501	78.77
##	1806	40.837502	78.54
##	1807	41.000000	78.07
##	1808	41.012501	78.37
##	1809	40.520000	79.80
##	1810	40.477501	80.08
##	1811	40.314999	80.12
##	1812	39.657501	78.88
##	1813	40.375000	79.08
##	1814	40.215000	79.61
##	1815	39.912498	79.86
##	1816	39.570000	79.68
##	1817	39.970001	80.38
##	1818	39.667500	80.00
##	1819	39.682499	80.05
##	1820	39.017502	80.50
##	1821	38.347500	80.01
##	1822	37.972500	79.53
##	1823	37.637501	79.15
##	1824	38.285000	79.39
##	1825	38.557499	79.29
##	1826	38.320000	78.95
##	1827	38.529999	78.14
##	1828	38.452499	78.45
##	1829	38.619999	79.22
##	1830	38.369999	79.09
##	1831	38.847500	79.41
##	1832	38.825001	79.00
##	1833	38.959999	80.53
##	1834	38.974998	84.13
##	1835	39.137501	85.73
##	1836	39.000000	86.10
##	1837	39.247501	86.62
##	1838	39.970001	85.74
##	1839	40.117500	85.98
##	1840	39.939999	86.22
##	1841	38.994999	86.40
##	1842	39.062500	87.44
##	1843	39.042500	88.65
##	1844	39.275002	87.98
##	1845	39.102501	88.48
##	1846	39.352501	88.62
##	1847	40.762501	88.17

##	1848	41.680000	86.95
##	1849	42.259998	87.31
##	1850	41.722500	87.94
##	1851	42.027500	88.80
##	1852	43.125000	89.68
##	1853	43.562500	88.70
##	1854	43.702499	88.95
##	1855	44.060001	90.26
##	1856	43.970001	90.30
##	1857	43.667500	90.92
##	1858	43.492500	90.99
##	1859	42.834999	91.09
##	1860	42.270000	89.83
##	1861	42.775002	99.62
##	1862	42.537498	97.47
##	1863	42.494999	97.48
##	1864	43.285000	96.52
##	1865	43.740002	96.41
##	1866	43.742500	96.62
##	1867	43.522499	96.62
##	1868	43.267502	96.77
##	1869	42.369999	97.56
##	1870	42.962502	97.23
##	1871	42.762501	97.35
##	1872	42.450001	97.01
##	1873	42.410000	97.83
##	1874	42.252499	97.28
##	1875	42.330002	96.78
##	1876	42.342499	96.55
##	1877	43.167500	96.93
##	1878	42.924999	96.70
##	1879	43.067501	97.76
##	1880	43.055000	97.13
##	1881	43.492500	97.11
##	1882	44.105000	97.90
##	1883	43.634998	98.80
##	1884	43.587502	98.75
##	1885	43.752499	98.06
##	1886	43.752499	98.21
##	1887	42.642502	99.16
##	1888	42.650002	99.26
##	1889	42.770000	99.40
##	1890	42.307499	98.75
##	1891	43.064999	98.59
##	1892	43.057499	99.45
##	1893	43.257500	99.54
##	1894	43.750000	100.13
##	1895	43.587502	101.61
##	1896	43.582500	100.39
##	1897	43.572498	99.67
##	1898	43.820000	100.02
##	1899	44.272499	100.87
##	1900	44.047501	100.69
##	1901	44.775002	102.70

##	1902	44.814999	104.30
##	1903	44.615002	104.59
##	1904	44.250000	105.45
##	1905	44.259998	105.90
##	1906	43.555000	105.79
##	1907	42.777500	106.60
##	1908	42.877499	108.39
##	1909	41.990002	109.55
##	1910	41.742500	107.73
##	1911	41.857498	106.60
##	1912	41.945000	105.52
##	1913	40.125000	104.48
##	1914	39.122501	100.09
##	1915	40.757500	100.90
##	1916	39.884998	102.85
##	1917	38.787498	100.02
##	1918	39.102501	99.37
##	1919	40.677502	99.55
##	1920	41.084999	100.98
##	1921	41.842499	101.70
##	1922	43.247501	103.23
##	1923	43.107498	104.78
##	1924	42.962502	94.11
##	1925	42.767502	91.52
##	1926	43.125000	92.77
##	1927	43.875000	92.89
##	1928	44.742500	93.12
##	1929	44.597500	91.52
##	1930	44.529999	90.01
##	1931	43.750000	89.08
##	1932	44.052502	88.77
##	1933	44.205002	89.98
##	1934	44.167500	89.06
##	1935	43.757500	87.74
##	1936	44.235001	87.92
##	1937	44.994999	88.72
##	1938	45.430000	88.07
##	1939	44.992500	88.30
##	1940	44.610001	87.67
##	1941	44.662498	87.51
##	1942	44.505001	89.17
##	1943	43.825001	87.45
##	1944	43.810001	87.95
##	1945	42.817501	88.18
##	1946	42.212502	87.14
##	1947	41.235001	85.42
##	1948	43.192501	87.50
##	1949	42.084999	86.05
##	1950	41.619999	87.77
##	1951	41.945000	88.97
##	1952	41.669998	85.55
##	1953	42.097500	86.80
##	1954	42.902500	87.22
##	1955	43.200001	87.81

##	1956	42.095001	86.69
##	1957	42.512501	86.28
##	1958	43.312500	86.45
##	1959	43.110001	85.91
##	1960	43.535000	85.43
##	1961	43.682499	86.02
##	1962	43.955002	86.84
##	1963	44.560001	87.90
##	1964	44.459999	87.57
##	1965	43.200001	87.89
##	1966	41.430000	86.98
##	1967	41.310001	86.10
##	1968	40.735001	86.53
##	1969	40.912498	87.17
##	1970	41.055000	87.94
##	1971	40.580002	87.29
##	1972	41.314999	88.46
##	1973	42.275002	87.41
##	1974	44.142502	86.34
##	1975	44.222500	86.23
##	1976	45.957500	87.53
##	1977	46.290001	85.47
##	1978	46.512501	85.74
##	1979	46.840000	83.06
##	1980	47.509998	82.69
##	1981	47.147499	83.38
##	1982	47.037498	84.39
##	1983	46.610001	84.52
##	1984	47.044998	86.13
##	1985	46.747501	84.49
##	1986	46.577499	83.64
##	1987	46.907501	84.51
##	1988	46.790001	83.37
##	1989	47.090000	83.01
##	1990	47.037498	82.85
##	1991	47.145000	82.46
##	1992	46.974998	82.40
##	1993	46.875000	84.12
##	1994	46.717499	82.54
##	1995	47.560001	82.99
##	1996	47.957500	85.42
##	1997	48.327499	84.62
##	1998	48.494999	84.56
##	1999	48.365002	84.95
##	2000	47.924999	84.36
##	2001	47.807499	84.30
##	2002	48.070000	84.10
##	2003	47.674999	84.09
##	2004	47.700001	83.79
##	2005	47.209999	83.70
##	2006	47.185001	83.00
##	2007	46.422501	83.61
##	2008	46.625000	83.61
##	2009	46.365002	84.21



##	2010	46.230000	84.82
##	2011	45.542500	86.47
##	2012	46.107498	85.98
##	2013	46.040001	86.89
##	2014	46.375000	85.86
##	2015	46.277500	85.65
##	2016	46.794998	84.00
##	2017	45.980000	84.44
##	2018	46.349998	84.57
##	2019	46.992500	84.51
##	2020	47.645000	85.93
##	2021	47.587502	87.21
##	2022	46.970001	86.53
##	2023	47.757500	86.52
##	2024	47.832500	87.70
##	2025	47.727501	87.64
##	2026	47.862499	88.19
##	2027	47.599998	88.07
##	2028	47.970001	87.72
##	2029	47.860001	88.06
##	2030	47.902500	87.63
##	2031	48.250000	87.96
##	2032	48.705002	87.90
##	2033	48.552502	88.23
##	2034	47.744999	88.13
##	2035	47.477501	88.88
##	2036	47.572498	89.23
##	2037	50.375000	88.24
##	2038	51.847500	88.76
##	2039	51.997501	89.60
##	2040	52.267502	89.67
##	2041	51.777500	89.77
##	2042	51.812500	90.05
##	2043	52.220001	89.01
##	2044	51.882500	90.18
##	2045	52.217499	89.64
##	2046	52.437500	90.85
##	2047	52.560001	90.22
##	2048	53.330002	98.64
##	2049	54.395000	97.85
##	2050	53.865002	96.00
##	2051	53.759998	96.08
##	2052	53.762501	95.67
##	2053	53.872501	95.18
##	2054	54.040001	94.95
##	2055	54.485001	94.54
##	2056	54.924999	96.07
##	2057	55.744999	95.64
##	2058	56.257500	96.10
##	2059	56.907501	95.86
##	2060	57.090000	95.36
##	2061	56.717499	96.62
##	2062	55.775002	96.45
##	2063	55.325001	95.83

##	2064	54.582500	96.90
##	2065	55.962502	96.64
##	2066	55.267502	95.97
##	2067	56.602501	95.12
##	2068	55.959999	94.59
##	2069	54.470001	94.82
##	2070	54.560001	95.43
##	2071	54.592499	95.24
##	2072	55.007500	95.75
##	2073	54.415001	95.90
##	2074	55.197498	94.92
##	2075	55.547501	95.10
##	2076	55.105000	94.59
##	2077	56.237499	94.13
##	2078	56.435001	93.91
##	2079	56.814999	94.40
##	2080	57.320000	95.15
##	2081	58.017502	94.07
##	2082	56.997501	94.21
##	2083	56.072498	93.31
##	2084	55.942501	94.69
##	2085	56.717499	97.08
##	2086	54.090000	95.76
##	2087	53.612499	93.92
##	2088	55.527500	94.81
##	2089	54.340000	93.82
##	2090	55.537498	95.81
##	2091	55.297501	96.56
##	2092	54.005001	96.17
##	2093	54.827499	97.15
##	2094	55.162498	97.14
##	2095	55.682499	97.80
##	2096	53.772499	97.56
##	2097	54.950001	99.18
##	2098	54.075001	98.94
##	2099	53.060001	99.80
##	2100	53.325001	102.42
##	2101	54.715000	100.28
##	2102	55.555000	100.58
##	2103	51.869999	101.34
##	2104	50.397499	102.91
##	2105	50.942501	103.33
##	2106	52.487499	104.32
##	2107	52.122501	104.88
##	2108	51.117500	105.56
##	2109	48.542500	103.87
##	2110	48.057499	102.94
##	2111	46.700001	101.53
##	2112	47.852501	99.54
##	2113	48.382500	97.69
##	2114	46.465000	96.78
##	2115	44.244999	94.16
##	2116	44.195000	94.17
##	2117	43.072498	95.10

##	2118	43.654999	95.15
##	2119	43.560001	95.04
##	2120	45.235001	97.46
##	2121	44.887501	97.29
##	2122	44.645000	97.65
##	2123	46.205002	98.75
##	2124	44.172501	95.81
##	2125	43.680000	94.77
##	2126	42.122501	93.19
##	2127	42.400002	93.94
##	2128	42.157501	93.85
##	2129	42.275002	93.11
##	2130	42.737499	92.96
##	2131	41.369999	91.85
##	2132	40.985001	90.77
##	2133	41.517502	91.08
##	2134	40.222500	90.55
##	2135	39.207500	87.28
##	2136	37.682499	87.13
##	2137	36.707500	85.82
##	2138	39.292500	90.41
##	2139	39.037498	91.59
##	2140	39.057499	92.13
##	2141	39.435001	93.15
##	2142	39.480000	93.34
##	2143	35.547501	92.86
##	2144	37.064999	93.44
##	2145	36.982498	94.54
##	2146	37.687500	95.20
##	2147	38.327499	94.89
##	2148	38.450001	94.96
##	2149	38.072498	94.84
##	2150	37.500000	94.95
##	2151	38.267502	96.25
##	2152	38.735001	96.35
##	2153	38.965000	96.74
##	2154	39.205002	97.73
##	2155	38.325001	97.49
##	2156	38.480000	98.71
##	2157	38.174999	98.36
##	2158	39.439999	96.94
##	2159	39.075001	97.06
##	2160	38.669998	96.71
##	2161	41.312500	94.80
##	2162	41.610001	95.83
##	2163	41.630001	93.86
##	2164	42.812500	94.77
##	2165	43.544998	95.60
##	2166	43.560001	95.64
##	2167	42.735001	96.73
##	2168	42.602501	95.58
##	2169	42.357498	96.20
##	2170	42.722500	96.97
##	2171	42.544998	97.94

##	2172	42.700001	98.52
##	2173	42.605000	99.99
##	2174	42.732498	102.20
##	2175	43.007500	99.88
##	2176	42.764999	99.39
##	2177	43.242500	99.55
##	2178	43.557499	99.12
##	2179	43.582500	98.69
##	2180	43.717499	98.11
##	2181	43.287498	98.99
##	2182	43.742500	97.93
##	2183	43.962502	97.85
##	2184	43.882500	98.34
##	2185	43.630001	98.26
##	2186	43.125000	97.45
##	2187	43.227501	97.59
##	2188	44.724998	98.48
##	2189	45.227501	98.37
##	2190	45.427502	99.03
##	2191	45.932499	98.22
##	2192	46.529999	98.42
##	2193	47.005001	99.66
##	2194	46.632500	99.85
##	2195	47.040001	98.64
##	2196	48.772499	99.06
##	2197	47.762501	98.28
##	2198	47.185001	98.17
##	2199	46.697498	98.32
##	2200	47.117500	97.21
##	2201	47.180000	97.13
##	2202	47.487499	97.53
##	2203	47.810001	97.82
##	2204	48.505001	96.94
##	2205	48.837502	97.19
##	2206	48.922501	98.11
##	2207	49.250000	98.83
##	2208	50.025002	99.23
##	2209	49.875000	98.69
##	2210	50.154999	99.60
##	2211	49.737499	100.80
##	2212	49.717499	101.56
##	2213	49.807499	102.43
##	2214	49.812500	102.93
##	2215	50.782501	103.16
##	2216	50.965000	103.18
##	2217	51.132500	102.37
##	2218	51.869999	103.07
##	2219	51.790001	103.53
##	2220	51.320000	103.52
##	2221	51.075001	101.53
##	2222	51.152500	101.56
##	2223	50.167500	102.84
##	2224	52.630001	101.36
##	2225	52.287498	101.15

##	2226	52.937500	102.08
##	2227	52.119999	102.46
##	2228	50.715000	101.30
##	2229	50.724998	100.30
##	2230	50.180000	99.54
##	2231	49.294998	101.91
##	2232	46.430000	99.89
##	2233	47.165001	100.29
##	2234	47.730000	99.88
##	2235	47.520000	101.31
##	2236	47.250000	100.86
##	2237	45.772499	101.52
##	2238	46.650002	101.12
##	2239	45.695000	102.23
##	2240	44.915001	101.86
##	2241	44.742500	102.67
##	2242	44.557499	102.42
##	2243	44.345001	102.12
##	2244	44.575001	102.19
##	2245	43.767502	101.44
##	2246	43.325001	101.96
##	2247	44.910000	102.56
##	2248	45.634998	104.42
##	2249	46.305000	105.11
##	2250	47.537498	106.06
##	2251	48.145000	107.52
##	2252	48.702499	107.94
##	2253	48.547501	108.82
##	2254	48.537498	108.65
##	2255	48.185001	109.07
##	2256	48.472500	109.16
##	2257	49.612499	109.65
##	2258	49.467499	109.62
##	2259	49.865002	110.32
##	2260	49.695000	111.13
##	2261	49.645000	111.24
##	2262	48.892502	110.72
##	2263	49.950001	110.16
##	2264	49.935001	110.10
##	2265	49.480000	110.49
##	2266	50.387501	110.62
##	2267	50.682499	111.60
##	2268	51.102501	112.32
##	2269	51.057499	111.98
##	2270	50.005001	112.72
##	2271	50.310001	112.88
##	2272	50.807499	112.98
##	2273	50.437500	113.92
##	2274	50.825001	114.60
##	2275	51.302502	114.98
##	2276	51.125000	114.76
##	2277	50.837502	114.60
##	2278	51.415001	114.72
##	2279	50.647499	113.90

##	2280	51.805000	112.82
##	2281	52.209999	112.09
##	2282	52.167500	112.00
##	2283	51.755001	112.22
##	2284	51.935001	113.02
##	2285	52.419998	112.27
##	2286	52.195000	112.06
##	2287	53.259998	110.38
##	2288	52.107498	109.38
##	2289	51.005001	109.40
##	2290	48.334999	105.82
##	2291	49.250000	107.27
##	2292	49.759998	108.20
##	2293	50.857498	108.52
##	2294	50.247501	107.28
##	2295	50.119999	105.22
##	2296	52.242500	107.41
##	2297	50.687500	106.20
##	2298	50.435001	112.69
##	2299	51.625000	112.99
##	2300	52.587502	113.81
##	2301	52.590000	112.05
##	2302	53.160000	112.02
##	2303	53.115002	111.91
##	2304	50.660000	110.83
##	2305	51.622501	111.99
##	2306	51.040001	112.42
##	2307	51.382500	112.72
##	2308	52.252499	114.08
##	2309	52.185001	114.26
##	2310	51.424999	114.64
##	2311	52.297501	115.91
##	2312	53.320000	115.44
##	2313	53.314999	114.73
##	2314	53.542500	116.33
##	2315	54.174999	116.05
##	2316	55.897499	116.02
##	2317	55.772499	116.92
##	2318	54.687500	117.43
##	2319	54.974998	115.57
##	2320	55.174999	116.51
##	2321	55.692501	117.16
##	2322	55.240002	117.11
##	2323	54.432499	116.98
##	2324	54.680000	117.62
##	2325	54.419998	118.40
##	2326	55.257500	118.47
##	2327	54.972500	118.30
##	2328	54.705002	118.45
##	2329	55.992500	118.68
##	2330	56.147499	117.85
##	2331	54.740002	116.12
##	2332	55.205002	116.31
##	2333	56.752499	118.16

##	2334	56.764999	117.23
##	2335	56.099998	117.58
##	2336	56.757500	118.93
##	2337	57.522499	119.61
##	2338	59.052502	120.24
##	2339	58.967499	119.17
##	2340	58.830002	119.53
##	2341	58.592499	119.42
##	2342	58.820000	119.84
##	2343	59.102501	119.14
##	2344	60.127499	119.74
##	2345	59.990002	119.58
##	2346	60.794998	119.35
##	2347	60.895000	119.10
##	2348	61.645000	119.04
##	2349	62.262501	119.22
##	2350	60.822498	117.15
##	2351	60.814999	118.10
##	2352	62.189999	117.26
##	2353	63.955002	117.62
##	2354	64.375000	117.57
##	2355	64.282501	118.86
##	2356	64.309998	119.50
##	2357	64.857498	120.23
##	2358	65.035004	119.44
##	2359	65.550003	119.04
##	2360	65.489998	119.12
##	2361	66.117500	120.98
##	2362	65.660004	120.65
##	2363	66.440002	118.87
##	2364	66.775002	120.25
##	2365	66.572502	119.89
##	2366	65.797501	119.13
##	2367	65.502502	119.86
##	2368	65.445000	119.36
##	2369	66.592499	118.92
##	2370	66.072502	119.19
##	2371	66.959999	118.76
##	2372	66.812500	119.09
##	2373	66.040001	119.28
##	2374	64.862503	118.67
##	2375	65.434998	118.69
##	2376	66.394997	118.66
##	2377	67.677498	119.78
##	2378	66.730003	119.36
##	2379	67.120003	119.14
##	2380	67.692497	119.00
##	2381	67.864998	119.76
##	2382	68.787498	120.29
##	2383	69.964996	120.54
##	2384	70.102501	121.28
##	2385	69.934998	119.86
##	2386	70.004997	120.08
##	2387	69.860001	120.29

##	2388	71.000000	119.03
##	2389	71.067497	119.51
##	2390	72.477501	119.52
##	2391	72.449997	119.59
##	2392	72.879997	119.40
##	2393	73.412498	118.84
##	2394	75.087502	118.94
##	2395	74.357498	117.89
##	2396	74.949997	117.65
##	2397	74.597504	116.56
##	2398	75.797501	116.16
##	2399	77.407501	117.36
##	2400	77.582497	116.38
##	2401	79.239998	115.88
##	2402	78.169998	116.18
##	2403	77.834999	115.28
##	2404	78.809998	115.90
##	2405	79.682503	114.96
##	2406	79.142502	115.59
##	2407	79.425003	116.10
##	2408	79.807503	115.81
##	2409	79.577499	114.37
##	2410	77.237503	115.86
##	2411	79.422501	116.60
##	2412	81.084999	115.89
##	2413	80.967499	116.58
##	2414	77.377502	114.49
##	2415	77.165001	114.27
##	2416	79.712502	115.27
##	2417	80.362503	116.81
##	2418	81.302498	116.31
##	2419	80.007500	116.45
##	2420	80.387497	115.25
##	2421	79.902496	115.40
##	2422	81.800003	115.85
##	2423	81.217499	117.44
##	2424	81.237503	117.89
##	2425	79.750000	119.63
##	2426	80.904999	117.68
##	2427	80.074997	117.69
##	2428	78.262497	118.58
##	2429	74.544998	116.32
##	2430	72.019997	114.39
##	2431	73.162498	113.78
##	2432	68.379997	110.40
##	2433	68.339996	107.68
##	2434	74.702499	115.88
##	2435	72.330002	112.91
##	2436	75.684998	116.77
##	2437	73.230003	115.92
##	2438	72.257500	117.23
##	2439	66.542503	117.16
##	2440	71.334999	119.79
##	2441	68.857498	114.43



##	2442	62.057499	104.05
##	2443	69.492500	114.10
##	2444	60.552502	106.76
##	2445	63.215000	119.26
##	2446	61.667500	122.58
##	2447	61.195000	119.45
##	2448	57.310001	113.97
##	2449	56.092499	114.28
##	2450	61.720001	115.03
##	2451	61.380001	109.40
##	2452	64.610001	109.82
##	2453	61.935001	109.58
##	2454	63.702499	115.19
##	2455	63.572498	113.62
##	2456	60.227501	114.14
##	2457	61.232498	118.65
##	2458	60.352501	119.48
##	2459	65.617500	126.07
##	2460	64.857498	121.99
##	2461	66.517502	121.84
##	2462	66.997498	121.80
##	2463	68.312500	125.30
##	2464	71.762497	129.00
##	2465	71.107498	128.76
##	2466	71.672501	132.33
##	2467	70.699997	132.12
##	2468	69.232498	129.85
##	2469	67.092499	129.21
##	2470	69.025002	131.59
##	2471	68.757500	128.53
##	2472	70.742500	129.44
##	2473	70.792503	128.30
##	2474	69.644997	128.00
##	2475	71.932503	123.60
##	2476	73.449997	121.55
##	2477	72.267502	122.92
##	2478	73.290001	123.70
##	2479	74.389999	124.73
##	2480	75.157501	123.30
##	2481	75.934998	121.89
##	2482	77.532501	122.94
##	2483	78.752502	123.67
##	2484	77.852501	123.78
##	2485	76.912498	123.71
##	2486	77.385002	123.42
##	2487	76.927498	125.94
##	2488	78.739998	127.66
##	2489	78.285004	124.95
##	2490	79.807503	125.45
##	2491	79.212502	124.99
##	2492	79.722504	124.33
##	2493	79.182503	123.86
##	2494	79.527496	122.48
##	2495	79.562500	123.69

##	2496	79.485001	124.06
##	2497	80.462502	123.96
##	2498	80.834999	123.94
##	2499	81.279999	123.47
##	2500	80.580002	122.11
##	2501	82.875000	121.56
##	2502	83.364998	121.24
##	2503	85.997498	121.35
##	2504	88.209999	121.16
##	2505	83.974998	120.09
##	2506	84.699997	117.74
##	2507	85.747498	118.08
##	2508	88.019997	119.65
##	2509	87.897499	119.03
##	2510	87.932503	117.99
##	2511	87.430000	119.85
##	2512	89.717499	121.68
##	2513	91.632500	121.07
##	2514	90.014999	120.30
##	2515	91.209999	119.71
##	2516	88.407501	118.32
##	2517	90.445000	119.06
##	2518	91.199997	119.78
##	2519	91.027496	119.69
##	2520	91.027496	119.21
##	2521	93.462502	118.89
##	2522	93.172501	126.95
##	2523	95.342499	124.44
##	2524	95.752502	127.75
##	2525	95.919998	130.68
##	2526	95.477501	129.52
##	2527	97.057503	132.01
##	2528	97.724998	132.00
##	2529	96.522499	132.20
##	2530	96.327499	131.74
##	2531	98.357498	131.47
##	2532	97.000000	132.33
##	2533	97.272499	132.66
##	2534	92.845001	131.64
##	2535	92.614998	131.24
##	2536	94.809998	131.21
##	2537	93.252502	131.76
##	2538	95.040001	130.69
##	2539	96.190002	130.12
##	2540	106.260002	129.40
##	2541	108.937500	129.30
##	2542	109.665001	131.64
##	2543	110.062500	129.81
##	2544	113.902496	129.35
##	2545	111.112503	129.97
##	2546	112.727501	131.88
##	2547	109.375000	130.20
##	2548	113.010002	131.89
##	2549	115.010002	131.85

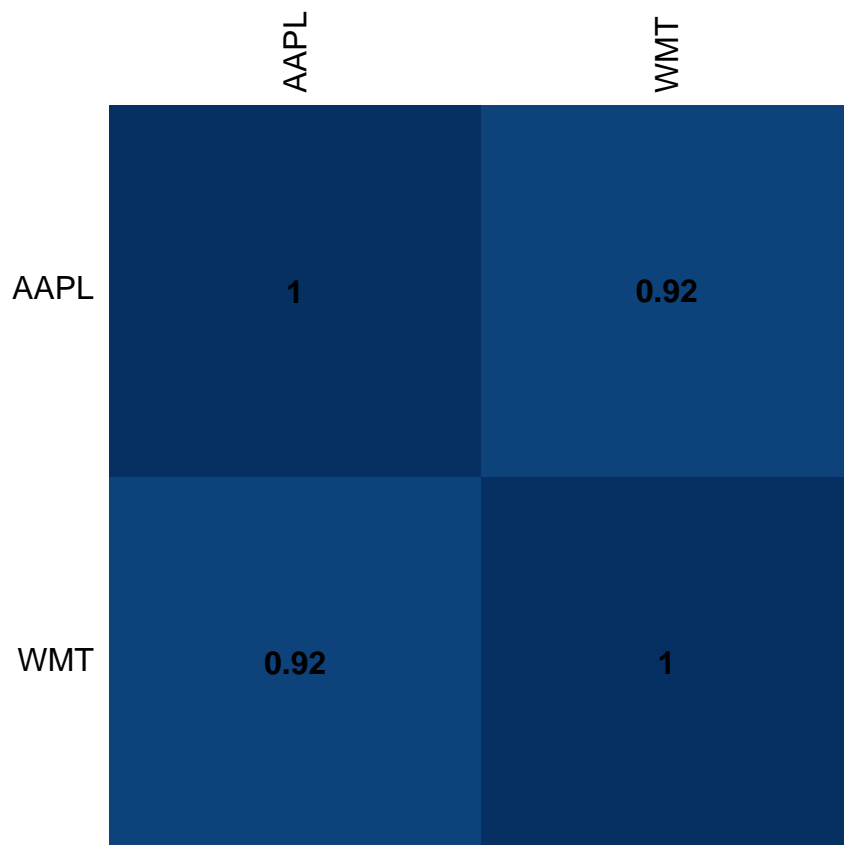
## 2550 114.907501 132.60  
## 2551 114.607498 135.60  
## 2552 115.562500 134.71  
## 2553 115.707497 132.41  
## 2554 118.275002 130.57  
## 2555 124.370003 131.63  
## 2556 125.857498 131.33  
## 2557 124.824997 130.63  
## 2558 126.522499 130.70  
## 2559 125.010002 136.63  
## 2560 124.807503 140.30  
## 2561 129.039993 138.85  
## 2562 134.179993 147.59  
## 2563 131.399994 147.68  
## 2564 120.879997 144.54  
## 2565 120.959999 142.83  
## 2566 112.820000 138.45  
## 2567 117.320000 139.89  
## 2568 113.489998 136.81  
## 2569 112.000000 136.70  
## 2570 115.360001 137.32  
## 2571 115.540001 137.36  
## 2572 112.129997 136.26  
## 2573 110.339996 136.69  
## 2574 106.839996 135.29  
## 2575 110.080002 137.07  
## 2576 111.809998 138.31  
## 2577 107.120003 135.99  
## 2578 108.220001 136.70  
## 2579 112.279999 137.27  
## 2580 114.959999 137.25  
## 2581 114.089996 137.14  
## 2582 115.809998 139.91  
## 2583 116.790001 143.08  
## 2584 113.019997 140.50  
## 2585 116.500000 141.80  
## 2586 113.160004 140.63  
## 2587 115.080002 140.89  
## 2588 114.970001 141.36  
## 2589 116.970001 142.78  
## 2590 124.400002 144.25  
## 2591 121.099998 146.23  
## 2592 121.190002 143.94  
## 2593 120.709999 144.53  
## 2594 119.019997 144.71  
## 2595 115.980003 142.95  
## 2596 117.510002 143.90  
## 2597 116.870003 144.40  
## 2598 115.750000 143.55  
## 2599 115.040001 143.85  
## 2600 115.050003 142.16  
## 2601 116.599998 142.87  
## 2602 111.199997 140.04  
## 2603 115.320000 139.92

```
## 2604 108.860001 138.75
## 2605 108.769997 140.40
## 2606 110.440002 142.78
## 2607 114.949997 141.96
## 2608 119.029999 143.47
## 2609 118.690002 145.77
## 2610 116.320000 143.54
## 2611 115.970001 145.56
## 2612 119.489998 147.98
## 2613 119.209999 148.23
## 2614 119.260002 150.54
## 2615 120.300003 152.44
## 2616 119.389999 149.37
## 2617 118.029999 149.09
## 2618 118.639999 152.12
## 2619 117.339996 150.24
## 2620 113.849998 150.93
## 2621 115.169998 151.36
## 2622 116.029999 151.83
## 2623 116.589996 151.60
## 2624 119.050003 152.79
## 2625 122.720001 152.64
## 2626 123.080002 150.52
## 2627 122.940002 149.30
## 2628 122.250000 148.91
## 2629 123.750000 148.11
## 2630 124.379997 149.45
## 2631 121.779999 148.27
## 2632 123.239998 147.04
## 2633 122.410004 147.00
## 2634 121.779999 145.65
## 2635 127.879997 145.58
## 2636 127.809998 145.43
## 2637 128.699997 146.10
## 2638 126.660004 145.95
```

```
cormatrix = cor(df_RD)
cormatrix
```

```
##          AAPL          WMT
## AAPL 1.0000000 0.9202637
## WMT  0.9202637 1.0000000
```

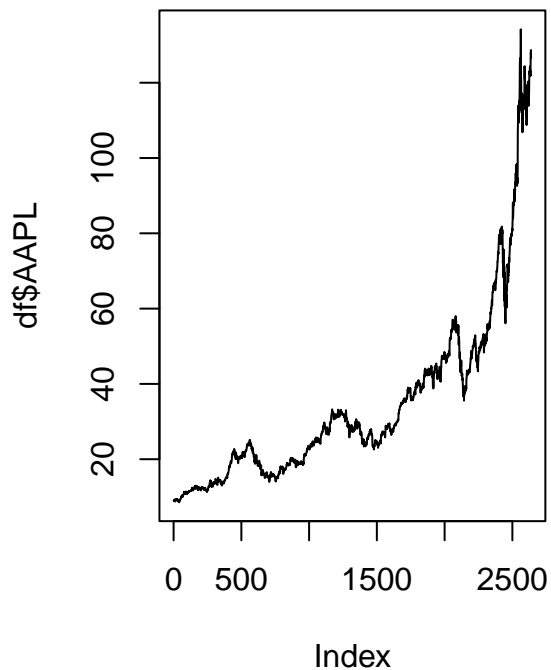
```
# PLOT
corrplot(cormatrix, method = "shade", tl.col = "black", addCoef.col = "black", cl.pos = "n", order = "A")
```



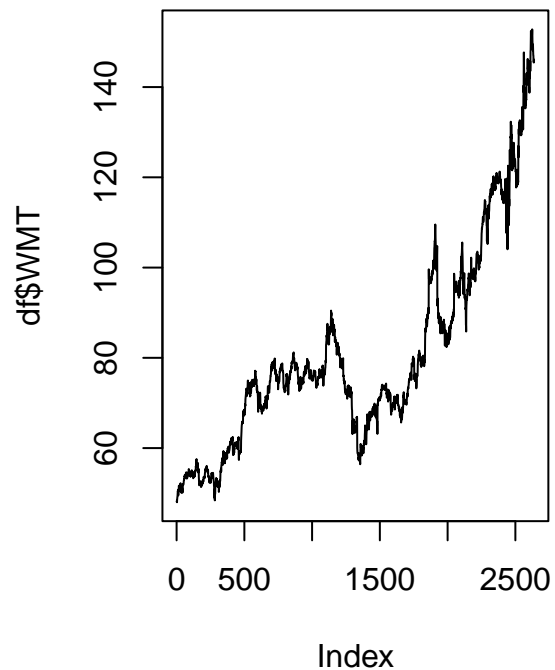
### Stationarity test

```
par(mfrow = c(1,2))  
plot(df$AAPL,type = 'l', main = "APPLE")  
plot(df$WMT, type = 'l', main = "WAL_MART")
```

## APPLE



## WAL\_MART



```
adf.test(df$AAPL)
```

```
## Augmented Dickey-Fuller Test
## alternative: stationary
##
## Type 1: no drift no trend
##      lag  ADF p.value
## [1,]  0 3.44    0.99
## [2,]  1 4.07    0.99
## [3,]  2 3.90    0.99
## [4,]  3 4.00    0.99
## [5,]  4 4.10    0.99
## [6,]  5 3.86    0.99
## [7,]  6 4.11    0.99
## [8,]  7 3.72    0.99
## [9,]  8 4.13    0.99
## Type 2: with drift no trend
##      lag  ADF p.value
## [1,]  0 2.45    0.99
## [2,]  1 3.08    0.99
## [3,]  2 2.91    0.99
## [4,]  3 3.02    0.99
## [5,]  4 3.14    0.99
## [6,]  5 2.92    0.99
## [7,]  6 3.17    0.99
## [8,]  7 2.80    0.99
```

```
## [9,] 8 3.20 0.99
## Type 3: with drift and trend
## lag ADF p.value
## [1,] 0 0.762 0.99
## [2,] 1 1.387 0.99
## [3,] 2 1.239 0.99
## [4,] 3 1.349 0.99
## [5,] 4 1.448 0.99
## [6,] 5 1.245 0.99
## [7,] 6 1.491 0.99
## [8,] 7 1.140 0.99
## [9,] 8 1.544 0.99
## ----
## Note: in fact, p.value = 0.01 means p.value <= 0.01
```

```
adf.test(df$WMT)
```

```
## Augmented Dickey-Fuller Test
## alternative: stationary
##
## Type 1: no drift no trend
## lag ADF p.value
## [1,] 0 1.67 0.977
## [2,] 1 1.96 0.988
## [3,] 2 1.96 0.988
## [4,] 3 1.94 0.987
## [5,] 4 2.07 0.990
## [6,] 5 2.11 0.990
## [7,] 6 2.20 0.990
## [8,] 7 2.08 0.990
## [9,] 8 2.34 0.990
## Type 2: with drift no trend
## lag ADF p.value
## [1,] 0 -0.0177 0.954
## [2,] 1 0.2996 0.977
## [3,] 2 0.2885 0.977
## [4,] 3 0.2883 0.977
## [5,] 4 0.4327 0.983
## [6,] 5 0.4860 0.985
## [7,] 6 0.5858 0.989
## [8,] 7 0.4949 0.985
## [9,] 8 0.7649 0.990
## Type 3: with drift and trend
## lag ADF p.value
## [1,] 0 -1.636 0.731
## [2,] 1 -1.254 0.894
## [3,] 2 -1.257 0.893
## [4,] 3 -1.273 0.886
## [5,] 4 -1.114 0.920
## [6,] 5 -1.062 0.929
## [7,] 6 -0.955 0.946
## [8,] 7 -1.081 0.926
## [9,] 8 -0.793 0.962
## ----
```

```
## Note: in fact, p.value = 0.01 means p.value <= 0.01
```

## Converting into stationary series

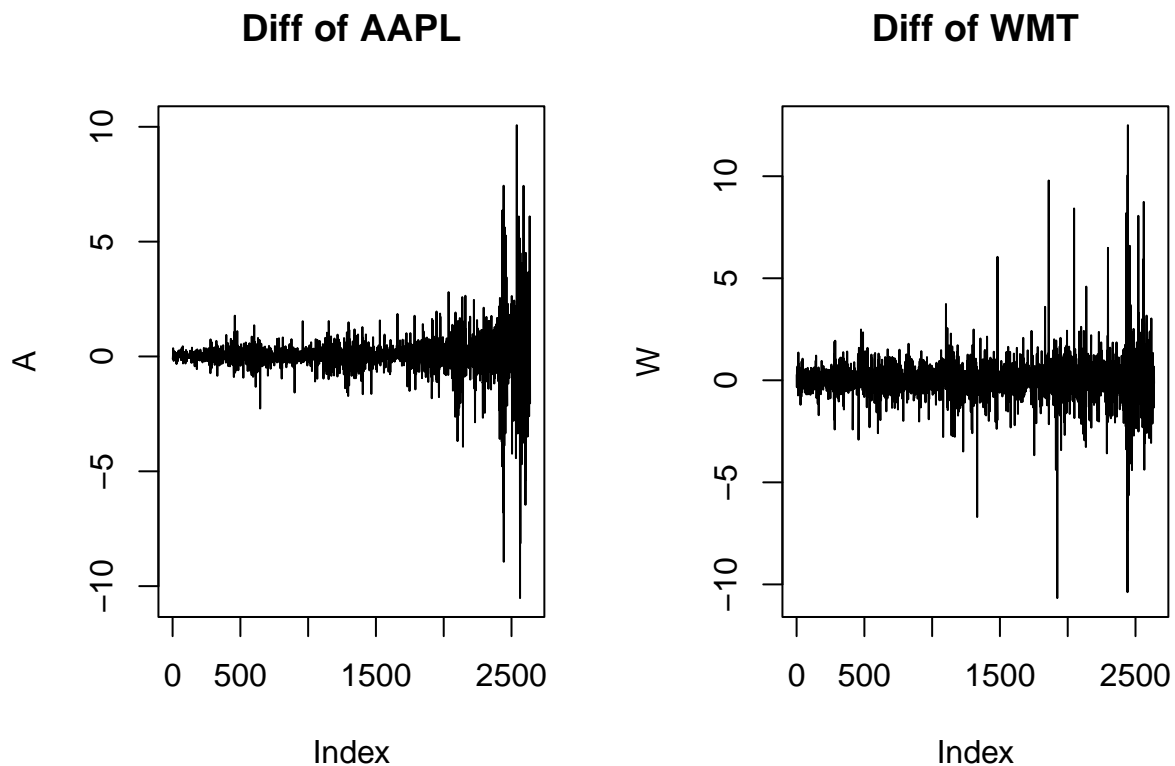
```
A = diff(df$AAPL)
str(A)
```

```
##  num [1:2637] -0.1089 -0.055 0.0604 0.3586 -0.0207 ...
```

```
W = diff(df$WMT)
str(W)
```

```
##  num [1:2637] 0.27 -0.34 0.57 0.35 0.26 ...
```

```
par(mfrow = c(1,2))
plot(A, main = ("Diff of AAPL"), type = "l")
plot(W, main = ("Diff of WMT"), type = "l")
```



```
## again to take the Augmented Dicky Fuller test.
```

```
adf.test(A)
```



```

## Augmented Dickey-Fuller Test
## alternative: stationary
##
## Type 1: no drift no trend
##      lag    ADF p.value
## [1,]  0 -58.1    0.01
## [2,]  1 -37.0    0.01
## [3,]  2 -30.5    0.01
## [4,]  3 -26.7    0.01
## [5,]  4 -22.4    0.01
## [6,]  5 -21.5    0.01
## [7,]  6 -18.1    0.01
## [8,]  7 -18.6    0.01
## [9,]  8 -15.7    0.01
## Type 2: with drift no trend
##      lag    ADF p.value
## [1,]  0 -58.3    0.01
## [2,]  1 -37.2    0.01
## [3,]  2 -30.7    0.01
## [4,]  3 -26.8    0.01
## [5,]  4 -22.6    0.01
## [6,]  5 -21.7    0.01
## [7,]  6 -18.3    0.01
## [8,]  7 -18.8    0.01
## [9,]  8 -15.9    0.01
## Type 3: with drift and trend
##      lag    ADF p.value
## [1,]  0 -58.4    0.01
## [2,]  1 -37.3    0.01
## [3,]  2 -30.8    0.01
## [4,]  3 -27.0    0.01
## [5,]  4 -22.7    0.01
## [6,]  5 -21.9    0.01
## [7,]  6 -18.5    0.01
## [8,]  7 -19.0    0.01
## [9,]  8 -16.2    0.01
## ----
## Note: in fact, p.value = 0.01 means p.value <= 0.01

```

```
adf.test(W)
```

```

## Augmented Dickey-Fuller Test
## alternative: stationary
##
## Type 1: no drift no trend
##      lag    ADF p.value
## [1,]  0 -58.0    0.01
## [2,]  1 -38.3    0.01
## [3,]  2 -30.5    0.01
## [4,]  3 -27.6    0.01
## [5,]  4 -24.7    0.01
## [6,]  5 -23.0    0.01
## [7,]  6 -20.1    0.01
## [8,]  7 -20.4    0.01

```

```
## [9,] 8 -17.6 0.01
## Type 2: with drift no trend
## lag ADF p.value
## [1,] 0 -58.0 0.01
## [2,] 1 -38.4 0.01
## [3,] 2 -30.6 0.01
## [4,] 3 -27.7 0.01
## [5,] 4 -24.8 0.01
## [6,] 5 -23.1 0.01
## [7,] 6 -20.2 0.01
## [8,] 7 -20.6 0.01
## [9,] 8 -17.7 0.01
## Type 3: with drift and trend
## lag ADF p.value
## [1,] 0 -58.0 0.01
## [2,] 1 -38.4 0.01
## [3,] 2 -30.6 0.01
## [4,] 3 -27.7 0.01
## [5,] 4 -24.8 0.01
## [6,] 5 -23.1 0.01
## [7,] 6 -20.2 0.01
## [8,] 7 -20.6 0.01
## [9,] 8 -17.8 0.01
## ----
## Note: in fact, p.value = 0.01 means p.value <= 0.01
```

## Casuality test

```
grangertest(A ~ W)
```

```
## Granger causality test
##
## Model 1: A ~ Lags(A, 1:1) + Lags(W, 1:1)
## Model 2: A ~ Lags(A, 1:1)
## Res.Df Df F Pr(>F)
## 1 2633
## 2 2634 -1 21.694 3.358e-06 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
grangertest(W ~ A)
```

```
## Granger causality test
##
## Model 1: W ~ Lags(W, 1:1) + Lags(A, 1:1)
## Model 2: W ~ Lags(W, 1:1)
## Res.Df Df F Pr(>F)
## 1 2633
## 2 2634 -1 11.262 0.0008025 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```