

# TSX Simluated Trading Algorithm

Tan Lin

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## Load Data

```
TSX = read.csv("TSX_Data.csv")
```

## Data Preparation

### Data Types

```
#Converting Text into Dates and Numbers  
TSX[, "Date"] = as.Date(TSX[, "Date"])  
TSX[, 2:7] = lapply(TSX[, 2:7], as.numeric)  
  
#Check If Converted  
class(TSX[1,1])
```

```
## [1] "Date"
```

```
class(TSX[1,2])
```

```
## [1] "numeric"
```

```
class(TSX[1,3])
```

```
## [1] "numeric"
```

```
class(TSX[1,4])
```

```
## [1] "numeric"
```

```
class(TSX[1,5])
```

```
## [1] "numeric"
```

```
class(TSX[1,6])
```

```
## [1] "numeric"
```

```
class(TSX[1,7])
```

```
## [1] "numeric"
```

## NA values

```
# Check for NA Values  
apply(sapply(TSX,is.na),2,sum)
```

##	Date	Open	High	Low	Close	Adj.Close	Volume
##	0	45	45	45	45	45	45

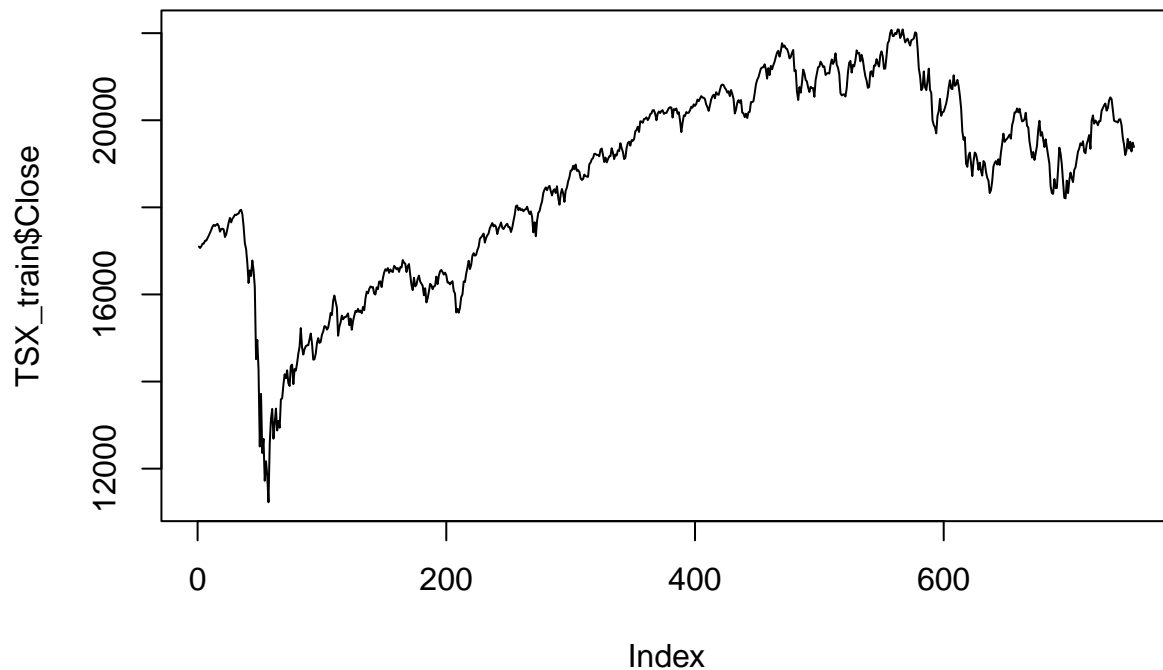
```
# Removing records with NA  
TSX = na.omit(TSX)
```

## Train and Test Data

```
# Selecting Dates before 2023 and after 2010 as Training Data  
TSX_train = TSX[TSX[, "Date"] < "2023-01-01",]  
TSX_train = TSX_train[TSX_train[, "Date"] >= "2020-01-01",]
```

```
# Selecting the Dates after 2023 as Testing Data  
TSX_test = TSX[TSX[, "Date"] >= "2023-01-01",]
```

```
plot(TSX_train$Close, type="l")
```



## Trading Simulation

```

train_size = length(TSX_train$Close)
money_out = rep(0,train_size)
money_in = rep(0, train_size)
price = TSX_train$Close
money_out[1] = 1
trade = 0

average7 = filter(price,rep(1/7,7),sides=1)
variance7 = rep(0,train_size)
deviations = rep(0,train_size)
percent_change = rep(0,train_size)
diff = rep(0,train_size)

for(i in 2:train_size){
  #Price Change
  percent_change[i] = price[i] / price[i-1]
  diff[i] = price[i] - price[i-1]

  money_in[i] = money_in[i-1] * percent_change[i]
  money_out[i] = money_out[i-1]
}

```

```

#Information
if(i > 7){
  variance7[i] = var(price[(i-7):(i-1)])
  deviations[i] = (price[i]-average7[i]) / sqrt(variance7[i])

  if(deviations[i] > 2)
  {
    trade = 1
  }
  if(deviations[i] < -2)
  {
    trade = -1
  }
}

#Trade
if(trade == 1){
  money_in[i] = money_out[i] + money_in[i]
  money_out[i] = 0
}
if(trade == -1)
{
  money_out[i] = money_in[i] + money_out[i]
  money_in[i] = 0
  data
}
trade = 0
}
data = data.frame(1:train_size,price,average7,diff,percent_change,variance7,deviations,money_in,money_out)
data

```

##	X1.train_size	price	average7	diff	percent_change	variance7
## 1	1	17100.0	NA	0.000000	0.000000	0.0000
## 2	2	17066.1	NA	-33.900391	0.9980175	0.0000
## 3	3	17105.5	NA	39.400391	1.0023087	0.0000
## 4	4	17168.1	NA	62.599609	1.0036596	0.0000
## 5	5	17167.8	NA	-0.298828	0.9999826	0.0000
## 6	6	17235.6	NA	67.798828	1.0039492	0.0000
## 7	7	17234.5	17153.94	-1.099609	0.9999362	0.0000
## 8	8	17293.4	17181.57	58.900391	1.0034176	4420.4521
## 9	9	17352.9	17222.54	59.500000	1.0034406	6286.3198
## 10	10	17415.2	17266.79	62.298828	1.0035901	6997.8536
## 11	11	17484.8	17312.03	69.601562	1.0039966	8617.0920
## 12	12	17559.0	17367.91	74.199219	1.0042436	12527.6091
## 13	13	17597.4	17419.60	38.400391	1.0021869	15582.7251
## 14	14	17572.3	17467.86	-25.099610	0.9985737	18325.5062
## 15	15	17599.9	17511.64	27.599610	1.0015706	13784.5173
## 16	16	17621.8	17550.06	21.900390	1.0012443	9381.1454
## 17	17	17565.3	17571.50	-56.500000	0.9967937	5482.1148
## 18	18	17442.5	17565.46	-122.800781	0.9930089	1953.2762
## 19	19	17500.9	17557.16	58.400391	1.0033482	3431.3879
## 20	20	17511.8	17544.93	10.900390	1.0006228	4038.6726

## 21	21	17490.6	17533.26	-21.201172	0.9987893	3937.1743
## 22	22	17318.5	17493.06	-172.099609	0.9901605	4145.3254
## 23	23	17379.8	17458.49	61.300781	1.0035396	9206.5281
## 24	24	17512.7	17450.97	132.898438	1.0076467	7187.5206
## 25	25	17651.6	17480.84	138.900390	1.0079314	5709.9216
## 26	26	17757.5	17517.50	105.900391	1.0059995	11365.5487
## 27	27	17655.5	17538.03	-102.000000	0.9942559	22487.3233
## 28	28	17740.6	17573.74	85.099609	1.0048200	25164.2558
## 29	29	17777.1	17639.26	36.500000	1.0020574	30140.4230
## 30	30	17832.9	17703.99	55.800782	1.0031389	21167.1488
## 31	31	17821.2	17748.06	-11.701172	0.9993438	11309.1139
## 32	32	17848.4	17776.17	27.201172	1.0015263	5234.5446
## 33	33	17858.3	17790.57	9.900390	1.0005547	4439.8553
## 34	34	17925.4	17829.13	67.099610	1.0037573	5264.0367
## 35	35	17944.1	17858.20	18.699218	1.0010432	3518.6959
## 36	36	17843.5	17867.69	-100.599609	0.9943937	3429.5132
## 37	37	17562.7	17829.09	-280.800781	0.9842631	2264.3383
## 38	38	17177.4	17737.11	-385.298828	0.9780615	15827.1705
## 39	39	17041.9	17621.90	-135.500000	0.9921117	76730.5875
## 40	40	16717.4	17458.91	-324.500000	0.9809587	139733.5243
## 41	41	16263.1	17221.44	-454.300782	0.9728247	235780.8476
## 42	42	16553.3	17022.76	290.201172	1.0178441	372049.9332
## 43	43	16423.6	16819.91	-129.701172	0.9921646	313358.1453
## 44	44	16779.5	16708.03	355.900391	1.0216701	212917.2284
## 45	45	16554.0	16618.97	-225.500000	0.9865610	106629.7664
## 46	46	16175.0	16495.13	-379.000000	0.9771052	64612.5684
## 47	47	14514.2	16180.39	-1660.799805	0.8973230	49759.6427
## 48	48	14958.1	15993.96	443.899414	1.0305838	579964.8311
## 49	49	14270.1	15667.79	-688.000000	0.9540049	787273.5846
## 50	50	12508.5	15108.49	-1761.599609	0.8765531	1106290.9593
## 51	51	13716.3	14670.89	1207.799805	1.0965583	2309643.5417
## 52	52	12360.4	14071.80	-1355.899414	0.9011469	1943882.8514
## 53	53	12685.2	13573.26	324.799804	1.0262775	1823865.6341
## 54	54	11721.4	13174.29	-963.799804	0.9240217	1117097.9209
## 55	55	12170.5	12776.06	449.099609	1.0383145	1355389.9537
## 56	56	11851.8	12430.59	-318.700195	0.9738137	807971.9695
## 57	57	11228.5	12247.73	-623.299805	0.9474088	439077.9005
## 58	58	12571.1	12084.13	1342.599609	1.1195707	639891.6505
## 59	59	13139.2	12195.39	568.100586	1.0451910	266643.7785
## 60	60	13371.2	12293.39	232.000000	1.0176571	425010.9295
## 61	61	12687.7	12431.43	-683.500000	0.9488827	604243.1678
## 62	62	13038.5	12555.43	350.799805	1.0276488	553397.4823
## 63	63	13378.8	12773.57	340.299805	1.0260996	585534.1490
## 64	64	12876.4	13008.99	-502.399414	0.9624481	560491.2498
## 65	65	13097.8	13084.23	221.399414	1.0171942	99722.6983
## 66	66	12938.3	13055.53	-159.500000	0.9878224	62474.8984
## 67	67	13592.7	13087.17	654.400390	1.0505785	64559.4828
## 68	68	13614.1	13219.51	21.399414	1.0015743	94875.4618
## 69	69	13925.7	13346.26	311.600586	1.0228881	94121.0820
## 70	70	14166.6	13458.80	240.899414	1.0172989	153035.4409
## 71	71	14075.9	13630.16	-90.699218	0.9935977	250242.3680
## 72	72	14258.4	13795.96	182.500000	1.0129654	222922.5061
## 73	73	13958.6	13941.71	-299.800782	0.9789737	209398.7893
## 74	74	13899.3	13985.51	-59.299804	0.9957517	66425.5310

## 75	75	14359.9	14092.06	460.600586	1.0331384	44185.3821
## 76	76	14388.3	14158.14	28.399414	1.0019777	31311.4401
## 77	77	13940.1	14125.79	-448.200196	0.9688497	36230.4116
## 78	78	14288.2	14156.11	348.100586	1.0249712	42920.8197
## 79	79	14251.1	14155.07	-37.100586	0.9974034	45829.3487
## 80	80	14420.4	14221.04	169.300782	1.0118798	45588.0403
## 81	81	14642.1	14327.16	221.699218	1.0153740	45810.1574
## 82	82	14798.3	14389.79	156.200196	1.0106679	44968.2554
## 83	83	15228.1	14509.76	429.799804	1.0290439	77209.4295
## 84	84	14780.7	14629.84	-447.399414	0.9706201	177545.4718
## 85	85	14620.3	14677.29	-160.400390	0.9891480	118871.5587
## 86	86	14745.0	14747.84	124.700195	1.0085293	96807.5055
## 87	87	14811.6	14803.73	66.599609	1.0045168	61491.2618
## 88	88	14830.7	14830.67	19.100586	1.0012896	40655.2646
## 89	89	14833.7	14835.73	3.000000	1.0002023	35575.6256
## 90	90	14966.6	14798.37	132.899414	1.0089593	35372.6644
## 91	91	15103.2	14844.44	136.600586	1.0091270	10939.8769
## 92	92	14881.2	14881.71	-222.000000	0.9853011	23898.2610
## 93	93	14503.2	14847.17	-378.000000	0.9745988	14129.4074
## 94	94	14509.7	14804.04	6.500000	1.0004482	33501.0193
## 95	95	14638.9	14776.64	129.200196	1.0089044	50101.1911
## 96	96	14885.5	14784.04	246.599609	1.0168455	53652.2168
## 97	97	14997.6	14788.47	112.099609	1.0075308	55020.7178
## 98	98	14884.9	14757.29	-112.699218	0.9924855	57044.4221
## 99	99	14913.6	14761.91	28.699218	1.0019281	40950.5168
## 100	100	15075.4	14843.66	161.800782	1.0108492	42438.7277
## 101	101	15148.1	14934.86	72.699218	1.0048224	39866.5942
## 102	102	15272.0	15025.30	123.900391	1.0081793	27022.5762
## 103	103	15262.7	15079.19	-9.299805	0.9993911	21825.1771
## 104	104	15192.8	15107.07	-69.900390	0.9954202	24573.3674
## 105	105	15236.2	15157.26	43.400390	1.0028566	24708.1304
## 106	106	15394.4	15225.94	158.200196	1.0103832	16322.1381
## 107	107	15575.1	15297.33	180.699218	1.0117380	10296.0972
## 108	108	15527.9	15351.59	-47.199218	0.9969696	20892.0955
## 109	109	15854.1	15434.74	326.199218	1.0210073	22606.6212
## 110	110	15974.9	15536.49	120.800782	1.0076195	55570.0418
## 111	111	15833.7	15628.04	-141.200196	0.9911611	87188.3987
## 112	112	15701.3	15694.49	-132.400390	0.9916381	72444.6199
## 113	113	15050.9	15645.41	-650.399414	0.9585767	42598.5005
## 114	114	15256.6	15599.91	205.699218	1.0136669	93814.3121
## 115	115	15359.7	15575.89	103.100586	1.0067578	115771.1429
## 116	116	15515.8	15527.56	156.099610	1.0101629	123850.3449
## 117	117	15428.7	15449.53	-87.099610	0.9943864	108826.6495
## 118	118	15479.8	15398.97	51.099610	1.0033120	69999.5727
## 119	119	15474.2	15366.53	-5.599610	0.9996383	42572.2925
## 120	120	15516.9	15433.10	42.700196	1.0027594	27053.8191
## 121	121	15564.8	15477.13	47.899414	1.0030869	9048.5231
## 122	122	15294.4	15467.80	-270.399414	0.9826275	4485.6582
## 123	123	15446.1	15457.84	151.699218	1.0099186	7650.8281
## 124	124	15189.0	15423.60	-257.099609	0.9833550	7229.6482
## 125	125	15389.7	15410.73	200.700195	1.0132135	17766.1795
## 126	126	15515.2	15416.59	125.500000	1.0081548	17238.0259
## 127	127	15622.4	15431.66	107.200196	1.0069094	18345.6131
## 128	128	15596.8	15436.23	-25.600586	0.9983613	23463.3787

## 129	129	15669.7	15489.84	72.900390	1.0046741	25029.8519
## 130	130	15595.5	15511.19	-74.200195	0.9952647	27408.5657
## 131	131	15629.2	15574.07	33.700195	1.0021609	28418.7830
## 132	132	15568.6	15599.63	-60.600586	0.9961226	8825.6779
## 133	133	15713.8	15628.00	145.200196	1.0093265	2403.1772
## 134	134	15639.4	15630.43	-74.399414	0.9952653	2448.5696
## 135	135	15908.5	15674.96	269.099609	1.0172065	2458.1242
## 136	136	16063.3	15731.19	154.799805	1.0097306	12843.6662
## 137	137	16024.5	15792.47	-38.799805	0.9975846	34285.4736
## 138	138	16123.5	15863.09	99.000000	1.0061780	41173.9918
## 139	139	16183.7	15950.96	60.200195	1.0037337	49176.9640
## 140	140	16163.0	16015.13	-20.700195	0.9987209	42847.2688
## 141	141	16171.1	16091.09	8.099609	1.0005011	36162.7212
## 142	142	16018.7	16106.83	-152.399414	0.9905758	9957.5455
## 143	143	15997.1	16097.37	-21.600586	0.9986515	4985.4228
## 144	144	16161.3	16116.91	164.200196	1.0102644	6572.0263
## 145	145	16121.3	16116.60	-40.000000	0.9975250	5922.5517
## 146	146	16294.7	16132.46	173.400390	1.0107560	5918.4133
## 147	147	16299.3	16151.93	4.599610	1.0002823	10161.2675
## 148	148	16169.2	16151.66	-130.099610	0.9920181	14202.8825
## 149	149	16368.0	16201.56	198.799805	1.0122950	14191.2599
## 150	150	16501.6	16273.63	133.599609	1.0081622	16140.7049
## 151	151	16579.1	16333.31	77.500000	1.0046965	18117.8128
## 152	152	16544.5	16393.77	-34.599609	0.9979131	27410.8469
## 153	153	16605.5	16438.17	61.000000	1.0036870	23088.1593
## 154	154	16497.0	16466.41	-108.500000	0.9934660	26623.8973
## 155	155	16575.3	16524.43	78.300781	1.0047464	23055.8795
## 156	156	16530.1	16547.59	-45.201172	0.9972730	6382.6215
## 157	157	16514.6	16549.44	-15.500000	0.9990623	1684.0395
## 158	158	16656.1	16560.44	141.500000	1.0085682	1508.9095
## 159	159	16626.1	16572.10	-30.000000	0.9981989	3117.1009
## 160	160	16577.4	16568.09	-48.699218	0.9970709	3634.6725
## 161	161	16606.8	16583.77	29.400390	1.0017735	3434.6274
## 162	162	16517.9	16575.57	-88.900390	0.9946467	2555.1897
## 163	163	16626.6	16589.36	108.699218	1.0065807	3187.9500
## 164	164	16617.5	16604.06	-9.099609	0.9994527	3055.5946
## 165	165	16790.0	16623.19	172.500000	1.0103806	2004.0429
## 166	166	16731.5	16638.24	-58.500000	0.9965158	6888.2066
## 167	167	16705.8	16656.59	-25.699219	0.9984640	8577.6126
## 168	168	16514.4	16643.39	-191.400390	0.9885429	8328.7771
## 169	169	16645.0	16661.54	130.599609	1.0079082	11081.8567
## 170	170	16698.0	16671.74	53.000000	1.0031841	8073.2298
## 171	171	16448.9	16647.66	-249.099609	0.9850821	7969.8612
## 172	172	16218.0	16565.94	-230.900391	0.9859626	15079.1447
## 173	173	16099.5	16475.66	-118.500000	0.9926933	34679.7206
## 174	174	16383.6	16429.63	284.099609	1.0176465	56862.9677
## 175	175	16185.3	16382.61	-198.299804	0.9878964	46975.9886
## 176	176	16222.5	16322.26	37.200195	1.0022984	53148.9661
## 177	177	16360.1	16273.99	137.599609	1.0084820	41697.2003
## 178	178	16431.3	16271.47	71.201172	1.0043521	15686.9311
## 179	179	16295.7	16282.57	-135.600586	0.9917474	14705.0368
## 180	180	16246.7	16303.60	-49.000000	0.9969931	14182.5983
## 181	181	16199.0	16277.23	-47.700195	0.9970640	8295.2956
## 182	182	15981.8	16248.16	-217.200195	0.9865918	8240.8102

## 183	183	16142.9	16236.79	161.100586	1.0100803	20392.6863
## 184	184	15817.1	16159.21	-325.800782	0.9798177	21978.6115
## 185	185	15912.3	16085.07	95.200196	1.0060188	41780.1075
## 186	186	16065.4	16052.17	153.100586	1.0096215	33189.3670
## 187	187	16242.8	16051.61	177.399414	1.0110423	24596.9695
## 188	188	16211.5	16053.40	-31.299805	0.9980730	24346.2302
## 189	189	16121.4	16073.34	-90.099609	0.9944422	24982.6589
## 190	190	16184.5	16079.29	63.099609	1.0039140	24434.8967
## 191	191	16199.3	16133.89	14.799805	1.0009144	25646.6362
## 192	192	16410.2	16205.01	210.899414	1.0130190	13112.2506
## 193	193	16236.1	16229.40	-174.099610	0.9893908	11751.2468
## 194	194	16428.3	16255.90	192.201172	1.0118379	7969.8591
## 195	195	16534.5	16302.04	106.199219	1.0064644	13714.2301
## 196	196	16562.8	16365.10	28.300781	1.0017116	23837.9760
## 197	197	16510.8	16411.71	-52.000000	0.9968604	25092.9004
## 198	198	16455.4	16448.30	-55.400390	0.9966446	20659.9046
## 199	199	16501.0	16461.27	45.599609	1.0027711	11896.3794
## 200	200	16438.8	16490.23	-62.199219	0.9962306	11921.0050
## 201	201	16274.1	16468.20	-164.701172	0.9899809	2576.4659
## 202	202	16273.3	16430.89	-0.799804	0.9999509	9156.4617
## 203	203	16230.2	16383.37	-43.099610	0.9973515	13130.4725
## 204	204	16279.4	16350.31	49.200196	1.0030314	14308.8041
## 205	205	16304.1	16328.70	24.699218	1.0015172	12129.2027
## 206	206	16079.6	16268.50	-224.500000	0.9862305	10099.6164
## 207	207	16020.9	16208.80	-58.699218	0.9963495	11265.5222
## 208	208	15586.6	16110.59	-434.300782	0.9728916	12491.2778
## 209	209	15670.7	16024.50	84.100586	1.0053957	65049.0927
## 210	210	15580.6	15931.70	-90.100586	0.9942504	84240.4499
## 211	211	15696.9	15848.49	116.300782	1.0074645	99982.4496
## 212	212	15939.2	15796.36	242.299804	1.0154362	80942.9288
## 213	213	15998.7	15784.80	59.500000	1.0037329	44546.8255
## 214	214	16298.2	15824.41	299.500000	1.0187203	37843.7350
## 215	215	16282.8	15923.87	-15.400390	0.9990551	70652.2838
## 216	216	16475.9	16038.90	193.100586	1.0118592	84705.4979
## 217	217	16615.4	16186.73	139.500000	1.0084669	109375.3507
## 218	218	16774.1	16340.61	158.699218	1.0095513	104265.3481
## 219	219	16582.2	16432.47	-191.900390	0.9885597	94149.8744
## 220	220	16675.6	16529.17	93.400390	1.0056326	67177.5245
## 221	221	16889.8	16613.69	214.201172	1.0128452	34760.4829
## 222	222	16948.1	16708.73	58.298828	1.0034517	39211.6830
## 223	223	16889.8	16767.86	-58.298828	0.9965602	29064.2212
## 224	224	16909.8	16809.91	20.000000	1.0011841	21415.0325
## 225	225	17019.1	16844.91	109.298828	1.0064636	18835.5791
## 226	226	17094.5	16918.10	75.400391	1.0044303	24485.7093
## 227	227	17274.3	17003.63	179.800781	1.0105180	17115.8110
## 228	228	17313.1	17064.10	38.798828	1.0022460	19926.8444
## 229	229	17351.3	17121.70	38.201172	1.0022065	29463.1544
## 230	230	17396.6	17194.10	45.298828	1.0026107	37097.0891
## 231	231	17190.3	17234.17	-206.298828	0.9881414	34613.7654
## 232	232	17296.9	17273.86	106.599610	1.0062011	19271.8085
## 233	233	17358.2	17311.53	61.298828	1.0035439	10380.8399
## 234	234	17398.0	17329.20	39.800781	1.0022929	4549.2661
## 235	235	17521.0	17358.90	123.000000	1.0070698	5200.1711
## 236	236	17582.4	17391.91	61.400391	1.0035044	10259.0613



## 237	237	17639.0	17426.54	56.599609	1.0032191	17303.2362
## 238	238	17559.9	17479.34	-79.099609	0.9955156	26075.7992
## 239	239	17593.3	17521.69	33.400390	1.0019021	16485.6312
## 240	240	17548.9	17548.93	-44.400390	0.9974763	11010.7422
## 241	241	17387.4	17547.41	-161.500000	0.9907971	5813.6564
## 242	242	17506.5	17545.34	119.099609	1.0068498	6362.9689
## 243	243	17567.4	17543.20	60.900391	1.0034787	6520.6753
## 244	244	17652.9	17545.19	85.500000	1.0048670	6367.5321
## 245	245	17534.6	17541.57	-118.300782	0.9932985	6839.0194
## 246	246	17500.9	17528.37	-33.699218	0.9980781	6806.3722
## 247	247	17552.5	17528.89	51.599609	1.0029484	6432.8003
## 248	248	17593.6	17558.34	41.099609	1.0023415	6459.2831
## 249	249	17623.9	17575.11	30.300782	1.0017223	2808.5674
## 250	250	17543.4	17571.69	-80.500000	0.9954323	2748.7535
## 251	251	17545.8	17556.39	2.400390	1.0001368	2892.7512
## 252	252	17433.4	17541.93	-112.400390	0.9935939	1632.0199
## 253	253	17527.8	17545.77	94.400390	1.0054149	3829.9780
## 254	254	17682.5	17564.34	154.699219	1.0088259	3565.4600
## 255	255	17828.1	17597.84	145.599609	1.0082341	6271.3027
## 256	256	18027.6	17655.51	199.500000	1.0111902	16413.9293
## 257	257	18042.1	17726.76	14.500000	1.0008043	43202.2184
## 258	258	17934.5	17782.29	-107.599609	0.9940362	60093.8455
## 259	259	17985.8	17861.20	51.300781	1.0028605	58231.8346
## 260	260	17934.7	17919.33	-51.101562	0.9971588	37582.6847
## 261	261	17958.1	17958.70	23.400390	1.0013048	16015.1375
## 262	262	17909.0	17970.26	-49.099609	0.9972659	5109.2672
## 263	263	17944.9	17958.44	35.900391	1.0020046	2522.3809
## 264	264	17957.4	17946.34	12.500000	1.0006966	1918.6735
## 265	265	18014.9	17957.83	57.500000	1.0032020	581.6359
## 266	266	17916.2	17947.89	-98.701172	0.9945211	1187.7047
## 267	267	17845.9	17935.20	-70.298828	0.9960762	1230.7914
## 268	268	17906.0	17927.76	60.099609	1.0033677	2747.5649
## 269	269	17779.4	17909.24	-126.599609	0.9929298	2737.6460
## 270	270	17424.4	17834.89	-355.000000	0.9800331	5947.3939
## 271	271	17657.2	17792.00	232.798828	1.0133605	38463.7337
## 272	272	17337.0	17695.16	-320.199219	0.9818658	39078.4593
## 273	273	17692.5	17663.20	355.500000	1.0205053	54360.2205
## 274	274	17874.5	17667.29	182.000000	1.0102868	45026.6661
## 275	275	17915.9	17668.70	41.400391	1.0023162	46885.2337
## 276	276	18042.0	17706.21	126.099609	1.0070384	47687.0245
## 277	277	18135.9	17807.86	93.900391	1.0052045	67228.2015
## 278	278	18330.3	17904.01	194.400390	1.0107191	72710.2322
## 279	279	18408.6	18057.10	78.298828	1.0042716	103631.2108
## 280	280	18457.8	18166.43	49.201172	1.0026727	65140.2338
## 281	281	18393.0	18240.50	-64.800781	0.9964892	55799.9627
## 282	282	18460.2	18318.26	67.199219	1.0036535	43750.9621
## 283	283	18492.5	18382.61	32.300781	1.0017498	27180.8798
## 284	284	18374.8	18416.74	-117.699219	0.9936353	14689.1416
## 285	285	18274.1	18408.71	-100.701172	0.9945196	3195.7932
## 286	286	18384.3	18405.24	110.201172	1.0060305	5266.4029
## 287	287	18416.7	18399.37	32.398438	1.0017623	5351.6793
## 288	288	18330.1	18390.39	-86.599610	0.9952978	4872.9447
## 289	289	18484.5	18393.86	154.400391	1.0084233	5571.7404
## 290	290	18223.5	18355.43	-261.000000	0.9858801	6221.6100

## 291	291	18060.3	18310.50	-163.199219	0.9910446	7713.9196
## 292	292	18299.6	18314.14	239.298828	1.0132500	19813.1020
## 293	293	18421.6	18319.47	122.000000	1.0066668	19596.5915
## 294	294	18320.7	18305.76	-100.900390	0.9945227	20667.6042
## 295	295	18125.7	18276.56	-195.000000	0.9893563	18872.8809
## 296	296	18381.0	18261.77	255.300781	1.0140850	23182.8358
## 297	297	18457.8	18295.24	76.800781	1.0041783	17539.1209
## 298	298	18599.2	18372.23	141.398438	1.0076606	22392.5378
## 299	299	18690.0	18428.00	90.800781	1.0048820	21676.6129
## 300	300	18844.6	18488.43	154.599609	1.0082718	33998.4073
## 301	301	18851.3	18564.23	6.701172	1.0003556	58657.2772
## 302	302	18954.8	18682.67	103.500000	1.0054903	69211.2246
## 303	303	18874.0	18753.10	-80.800781	0.9957372	46217.4592
## 304	304	18983.1	18828.14	109.099609	1.0057804	31364.0460
## 305	305	18836.5	18862.04	-146.599609	0.9922774	19077.0758
## 306	306	18854.0	18885.47	17.500000	1.0009290	9012.0974
## 307	307	18815.1	18881.26	-38.900391	0.9979368	3449.3675
## 308	308	18669.8	18855.33	-145.298828	0.9922775	3975.5962
## 309	309	18628.3	18808.69	-41.500000	0.9977772	10493.9986
## 310	310	18651.1	18776.84	22.798828	1.0012239	14897.0114
## 311	311	18752.6	18743.91	101.500000	1.0054420	17141.9575
## 312	312	18719.2	18727.16	-33.400390	0.9982189	8884.6037
## 313	313	18705.6	18705.96	-13.599610	0.9992735	7230.1194
## 314	314	18700.7	18689.61	-4.900390	0.9997380	4101.7033
## 315	315	18990.3	18735.40	289.601562	1.0154861	1809.3544
## 316	316	19026.8	18792.33	36.500000	1.0019220	14366.9510
## 317	317	19104.1	18857.04	77.298828	1.0040626	22826.6627
## 318	318	19129.1	18910.83	25.000000	1.0013086	30816.6861
## 319	319	19228.9	18983.64	99.800782	1.0052172	37959.4010
## 320	320	19228.0	19058.27	-0.900391	0.9999532	42515.1397
## 321	321	19201.3	19129.79	-26.699219	0.9986114	33084.5299
## 322	322	19203.7	19160.27	2.398438	1.0001249	9217.7266
## 323	323	19171.7	19180.97	-32.000000	0.9983337	5801.3073
## 324	324	19321.9	19212.09	150.201172	1.0078345	2354.1072
## 325	325	19351.3	19243.83	29.400390	1.0015216	3549.9453
## 326	326	19204.4	19240.33	-146.900390	0.9924088	4456.7501
## 327	327	19040.8	19213.59	-163.599610	0.9914811	4664.4145
## 328	328	19143.3	19205.30	102.500000	1.0053832	10439.9422
## 329	329	19031.6	19180.71	-111.701172	0.9941650	11158.0266
## 330	330	19102.3	19170.80	70.701172	1.0037149	15481.0529
## 331	331	19170.6	19149.19	68.298828	1.0035754	16377.6237
## 332	332	19175.1	19124.01	4.500000	1.0002347	12027.3885
## 333	333	19357.0	19145.81	181.900391	1.0094863	4591.7056
## 334	334	19255.9	19176.54	-101.099609	0.9947771	12007.3199
## 335	335	19108.3	19171.54	-147.599610	0.9923348	11087.5451
## 336	336	19213.2	19197.49	104.898438	1.0054897	11650.3706
## 337	337	19188.0	19209.73	-25.199219	0.9986884	7890.3534
## 338	338	19310.7	19229.74	122.699219	1.0063946	6220.4540
## 339	339	19291.0	19246.30	-19.699219	0.9989799	7197.1250
## 340	340	19472.7	19262.83	181.699219	1.0094189	7005.0572
## 341	341	19361.9	19277.97	-110.798828	0.9943100	13186.6904
## 342	342	19274.0	19301.64	-87.900391	0.9954601	14547.0435
## 343	343	19107.8	19286.59	-166.199219	0.9913770	9097.9402
## 344	344	19135.8	19279.13	28.000000	1.0014654	13792.1800

## 345	345	19366.7	19287.13	230.898438	1.0120663	15896.7960
## 346	346	19474.7	19313.37	108.000000	1.0055766	16934.1137
## 347	347	19507.1	19318.29	32.400390	1.0016637	21991.9416
## 348	348	19417.0	19326.16	-90.099609	0.9953812	23987.9769
## 349	349	19543.0	19364.59	126.000000	1.0064892	25222.7370
## 350	350	19527.3	19424.51	-15.699219	0.9991967	30883.2706
## 351	351	19564.1	19485.70	36.798828	1.0018845	20116.2209
## 352	352	19745.5	19539.81	181.400391	1.0092721	5103.3750
## 353	353	19774.4	19582.63	28.900391	1.0014636	10576.1162
## 354	354	19852.2	19631.93	77.798828	1.0039343	16902.6486
## 355	355	19731.0	19676.79	-121.199219	0.9938949	25227.6952
## 356	356	19976.0	19738.64	245.000000	1.0124170	16816.9809
## 357	357	19971.2	19802.06	-4.800781	0.9997597	24291.3857
## 358	358	19941.4	19855.96	-29.798828	0.9985079	21169.3165
## 359	359	20029.2	19896.49	87.798828	1.0044028	11578.7110
## 360	360	20035.3	19933.76	6.101562	1.0003046	12631.0789
## 361	361	20065.9	19964.29	30.599610	1.0015273	11737.8736
## 362	362	20002.3	20003.04	-63.599610	0.9968305	12452.2381
## 363	363	20049.5	20013.54	47.199219	1.0023597	1870.2460
## 364	364	20138.4	20037.43	88.900391	1.0044340	1979.4433
## 365	365	20157.7	20068.33	19.298828	1.0009583	3613.2158
## 366	366	20231.3	20097.20	73.601562	1.0036513	3373.1990
## 367	367	20231.0	20125.16	-0.300781	0.9999851	6572.1630
## 368	368	20144.0	20136.31	-87.000000	0.9956997	8005.4340
## 369	369	19999.6	20135.93	-144.400391	0.9928316	7334.1493
## 370	370	20156.4	20151.20	156.800782	1.0078402	7455.8563
## 371	371	20200.7	20160.10	44.298828	1.0021978	6008.6346
## 372	372	20164.4	20161.06	-36.298828	0.9982031	6297.2824
## 373	373	20215.1	20158.74	50.699218	1.0025143	6298.3350
## 374	374	20230.3	20158.64	15.201172	1.0007520	5956.4891
## 375	375	20145.3	20158.83	-85.000000	0.9957984	5939.7177
## 376	376	20171.0	20183.31	25.699219	1.0012757	5933.6104
## 377	377	20165.6	20184.63	-5.400391	0.9997323	1033.1725
## 378	378	20226.1	20188.26	60.500000	1.0030002	962.7324
## 379	379	20281.5	20204.99	55.400391	1.0027391	1190.9674
## 380	380	20300.0	20217.11	18.500000	1.0009122	2218.6602
## 381	381	20290.6	20225.73	-9.400391	0.9995369	3534.6084
## 382	382	20061.2	20213.71	-229.400390	0.9886943	4319.0708
## 383	383	20258.0	20226.14	196.800781	1.0098100	7584.2091
## 384	384	20233.1	20235.79	-24.900391	0.9987708	7426.7886
## 385	385	20270.7	20242.16	37.599610	1.0018583	6715.4647
## 386	386	20147.2	20222.97	-123.500000	0.9939075	6855.6307
## 387	387	20183.7	20206.36	36.500000	1.0018117	7671.0283
## 388	388	19985.5	20162.77	-198.199219	0.9901802	6617.1174
## 389	389	19726.5	20114.96	-259.000000	0.9870406	11347.5802
## 390	390	19942.7	20069.91	216.199219	1.0109598	38682.9373
## 391	391	20110.1	20052.34	167.400390	1.0083941	37851.1379
## 392	392	20097.5	20027.60	-12.599609	0.9993735	33321.8048
## 393	393	20188.4	20033.49	90.900391	1.0045230	25000.8162
## 394	394	20165.0	20030.81	-23.400391	0.9988409	26885.8695
## 395	395	20173.4	20057.66	8.400391	1.0004166	25999.5279
## 396	396	20230.4	20129.64	57.000000	1.0028255	28205.1381
## 397	397	20311.8	20182.37	81.400390	1.0040237	8855.4006
## 398	398	20287.8	20207.76	-24.000000	0.9988184	5317.2847

## 399	399	20365.9	20246.10	78.099610	1.0038496	5547.4434
## 400	400	20329.7	20266.29	-36.201172	0.9982225	5974.3079
## 401	401	20375.5	20296.36	45.800781	1.0022529	6108.8519
## 402	402	20475.4	20339.50	99.900391	1.0049030	5331.9871
## 403	403	20437.4	20369.07	-38.000000	0.9981441	5983.4555
## 404	404	20495.7	20395.34	58.298828	1.0028526	4576.8489
## 405	405	20554.0	20433.37	58.300781	1.0028445	5897.4046
## 406	406	20520.6	20455.47	-33.400391	0.9983750	6478.0070
## 407	407	20518.1	20482.39	-2.500000	0.9998782	6417.6064
## 408	408	20483.4	20497.80	-34.699218	0.9983088	3589.7782
## 409	409	20363.6	20481.83	-119.800782	0.9941513	1408.6589
## 410	410	20302.1	20462.50	-61.500000	0.9969799	4029.0521
## 411	411	20215.4	20422.46	-86.699218	0.9957295	8647.9531
## 412	412	20339.0	20391.74	123.599609	1.0061141	16769.9452
## 413	413	20477.3	20385.56	138.300781	1.0067998	13946.2706
## 414	414	20547.8	20389.80	70.500000	1.0034428	12354.3138
## 415	415	20587.3	20404.64	39.500000	1.0019223	13792.5582
## 416	416	20504.2	20424.73	-83.101562	0.9959635	18576.4406
## 417	417	20644.6	20473.66	140.400390	1.0068474	19476.9084
## 418	418	20595.0	20527.89	-49.599609	0.9975975	22234.7788
## 419	419	20582.9	20562.73	-12.099609	0.9994125	10141.8199
## 420	420	20689.6	20593.06	106.699218	1.0051839	3283.5732
## 421	421	20795.1	20628.39	105.500000	1.0050992	3676.8354
## 422	422	20821.4	20661.83	26.300782	1.0012648	8682.8886
## 423	423	20806.6	20705.03	-14.800782	0.9992892	13305.8552
## 424	424	20741.8	20718.91	-64.798828	0.9968857	10480.5265
## 425	425	20705.3	20734.67	-36.500000	0.9982403	9872.3321
## 426	426	20633.1	20741.84	-72.201172	0.9965129	7054.4201
## 427	427	20666.4	20738.53	33.300782	1.0016139	4874.8160
## 428	428	20553.3	20703.99	-113.099610	0.9945274	5355.7035
## 429	429	20693.8	20685.76	140.500000	1.0068359	9148.4953
## 430	430	20602.1	20656.54	-91.701172	0.9955687	6480.4387
## 431	431	20490.4	20620.63	-111.699218	0.9945783	4217.3587
## 432	432	20154.5	20541.94	-335.900391	0.9836069	6101.6457
## 433	433	20244.3	20486.40	89.800781	1.0044556	33896.0818
## 434	434	20401.5	20448.56	157.199219	1.0077651	43677.1640
## 435	435	20461.9	20435.50	60.400391	1.0029606	37807.7429
## 436	436	20402.7	20393.91	-59.201172	0.9971068	35809.9830
## 437	437	20463.4	20374.10	60.701172	1.0029752	22851.8212
## 438	438	20174.1	20328.91	-289.300782	0.9858625	15974.9870
## 439	439	20158.1	20329.43	-16.000000	0.9992069	18005.3486
## 440	440	20070.3	20304.57	-87.798828	0.9956445	17797.9251
## 441	441	20150.9	20268.77	80.599610	1.0040159	27060.4798
## 442	442	20052.3	20210.26	-98.599610	0.9951069	27935.1778
## 443	443	20183.4	20178.93	131.099610	1.0065379	25534.0753
## 444	444	20191.7	20140.11	8.298828	1.0004112	18336.9252
## 445	445	20416.2	20174.70	224.500000	1.0111184	3119.1072
## 446	446	20416.3	20211.59	0.101562	1.0000050	14234.8839
## 447	447	20437.1	20263.99	20.798828	1.0010187	22330.1101
## 448	448	20618.5	20330.79	181.400391	1.0088760	24275.8974
## 449	449	20819.9	20440.44	201.400391	1.0097679	37885.2988
## 450	450	20928.1	20546.83	108.199218	1.0051969	50803.0607
## 451	451	20985.4	20660.21	57.300782	1.0027380	66221.9084
## 452	452	21087.0	20756.04	101.599609	1.0048414	62260.9321

## 453	453	21188.2	20866.31	101.199219	1.0047991	71981.0551
## 454	454	21212.4	20977.07	24.201172	1.0011422	69683.7383
## 455	455	21216.2	21062.46	3.798828	1.0001791	44630.4617
## 456	456	21284.8	21128.87	68.601562	1.0032335	24226.0822
## 457	457	21173.5	21163.93	-111.300781	0.9947709	17513.9098
## 458	458	20955.0	21159.59	-218.500000	0.9896805	9693.8036
## 459	459	21197.5	21175.37	242.500000	1.0115724	11634.9387
## 460	460	21037.1	21153.79	-160.400391	0.9924331	10705.6884
## 461	461	21247.0	21158.73	209.900391	1.0099776	13321.1788
## 462	462	21170.0	21152.13	-77.000000	0.9963760	14168.2128
## 463	463	21265.1	21149.31	95.099609	1.0044922	13588.0886
## 464	464	21342.1	21173.40	77.000000	1.0036210	12772.2710
## 465	465	21455.8	21244.94	113.701172	1.0053276	18192.3438
## 466	466	21556.5	21296.23	100.699219	1.0046933	17562.8495
## 467	467	21594.5	21375.86	38.000000	1.0017628	30297.0991
## 468	468	21461.9	21406.56	-132.599609	0.9938596	26535.9425
## 469	469	21582.0	21465.41	120.099609	1.0055959	23902.9131
## 470	470	21768.5	21537.33	186.500000	1.0086415	15664.8673
## 471	471	21683.1	21586.04	-85.400391	0.9960769	18253.7368
## 472	472	21717.2	21623.39	34.099610	1.0015726	12674.2701
## 473	473	21653.0	21637.17	-64.199219	0.9970439	11087.2082
## 474	474	21637.5	21643.31	-15.500000	0.9992842	10266.0427
## 475	475	21555.0	21656.61	-82.500000	0.9961872	9918.5634
## 476	476	21420.8	21633.59	-134.199219	0.9937741	5526.9322
## 477	477	21453.8	21588.63	33.000000	1.0015406	13248.3478
## 478	478	21548.4	21569.39	94.599610	1.0044095	13243.8111
## 479	479	21613.2	21554.53	64.798828	1.0030071	11594.0714
## 480	480	21125.9	21479.23	-487.298828	0.9774536	8015.0186
## 481	481	21149.0	21409.44	23.099609	1.0010934	30404.2020
## 482	482	20660.0	21281.59	-489.000000	0.9768783	38722.6955
## 483	483	20464.6	21144.99	-195.400391	0.9905421	109730.3573
## 484	484	20762.0	21046.16	297.400391	1.0145324	195975.1320
## 485	485	20633.3	20915.43	-128.699219	0.9938012	193132.0702
## 486	486	20861.1	20807.99	227.798828	1.0110403	159560.8001
## 487	487	21162.7	20813.24	301.599610	1.0144575	65437.4786
## 488	488	21077.4	20803.01	-85.298828	0.9959694	69530.5576
## 489	489	20925.5	20840.94	-151.900391	0.9927932	62249.5526
## 490	490	20890.6	20901.80	-34.900391	0.9983322	59662.8289
## 491	491	20748.5	20899.87	-142.099609	0.9931979	32147.2385
## 492	492	20648.6	20902.06	-99.900391	0.9951852	32802.3740
## 493	493	20769.2	20888.93	120.599610	1.0058406	31476.4044
## 494	494	20739.8	20828.51	-29.398438	0.9985845	33937.5946
## 495	495	20739.2	20780.20	-0.601562	0.9999710	20894.1749
## 496	496	20538.2	20724.87	-201.000000	0.9903082	9176.3158
## 497	497	20924.9	20729.77	386.701172	1.0188284	11846.8613
## 498	498	21070.1	20775.71	145.199218	1.0069391	13909.8115
## 499	499	21218.9	20857.19	148.800782	1.0070622	30692.7228
## 500	500	21229.7	20922.97	10.798828	1.0005089	52991.5258
## 501	501	21344.7	21009.39	115.000000	1.0054169	69779.9458
## 502	502	21294.6	21088.73	-50.099610	0.9976528	85118.4982
## 503	503	21222.8	21186.53	-71.798828	0.9966283	79165.0936
## 504	504	21236.5	21231.04	13.699219	1.0006455	20488.2706
## 505	505	21039.7	21226.70	-196.800781	0.9907329	7184.4859
## 506	506	21072.2	21205.74	32.500000	1.0015447	8947.4230

## 507	507	21084.5	21185.00	12.300781	1.0005837	12403.2780
## 508	508	21072.3	21146.09	-12.199219	0.9994214	14255.6078
## 509	509	21274.8	21143.26	202.500000	1.0096098	10355.1064
## 510	510	21395.0	21167.86	120.199219	1.0056498	9430.9715
## 511	511	21293.0	21175.93	-102.000000	0.9952325	18232.8308
## 512	512	21357.6	21221.34	64.599609	1.0030338	19981.6403
## 513	513	21537.5	21287.81	179.900391	1.0084232	19983.0890
## 514	514	21274.6	21314.97	-262.900391	0.9877934	27780.1228
## 515	515	21205.2	21333.96	-69.400390	0.9967379	20059.3418
## 516	516	21058.2	21303.01	-147.000000	0.9930677	11832.2956
## 517	517	20621.4	21192.50	-436.798828	0.9792575	22805.7272
## 518	518	20571.3	21089.40	-50.099610	0.9975705	84579.3683
## 519	519	20591.0	20979.89	19.699219	1.0009576	134809.4863
## 520	520	20595.9	20845.37	4.900391	1.0002380	150229.1042
## 521	521	20544.1	20741.01	-51.800782	0.9974849	101871.1510
## 522	522	20741.8	20674.81	197.701172	1.0096233	73586.9683
## 523	523	21098.3	20680.54	356.500000	1.0171875	32562.9752
## 524	524	21319.9	20780.33	221.599610	1.0105032	37917.4848
## 525	525	21362.4	20893.34	42.500000	1.0019934	93847.3778
## 526	526	21094.0	20965.20	-268.400391	0.9874359	128132.1869
## 527	527	21271.9	21061.77	177.900391	1.0084337	113583.4546
## 528	528	21235.5	21160.54	-36.400391	0.9982888	95650.1529
## 529	529	21377.2	21251.31	141.699219	1.0066728	44634.5526
## 530	530	21604.2	21323.59	227.000000	1.0106188	13620.9983
## 531	531	21531.7	21353.84	-72.500000	0.9966442	24379.7623
## 532	532	21548.8	21380.47	17.101562	1.0007943	30527.9757
## 533	533	21352.5	21417.40	-196.300781	0.9908904	36023.2853
## 534	534	21502.6	21450.36	150.099609	1.0070296	20885.0473
## 535	535	21383.6	21471.51	-119.000000	0.9944658	17299.3395
## 536	536	21176.3	21442.81	-207.298828	0.9903057	9825.9566
## 537	537	21008.2	21357.67	-168.101562	0.9920618	21907.5911
## 538	538	20907.8	21268.54	-100.398438	0.9952210	40590.9050
## 539	539	20744.2	21153.60	-163.601562	0.9921751	60006.0302
## 540	540	20761.9	21069.23	17.701172	1.0008533	77324.1209
## 541	541	21106.0	21012.57	344.099609	1.0165736	87997.0446
## 542	542	21126.4	20975.83	20.400391	1.0009666	53175.6210
## 543	543	21004.5	20951.29	-121.900391	0.9942299	30816.4405
## 544	544	21255.6	20986.63	251.099609	1.0119546	23552.5207
## 545	545	21250.4	21035.57	-5.199218	0.9997554	36989.8455
## 546	546	21402.4	21129.60	152.000000	1.0071528	44755.5004
## 547	547	21304.4	21207.10	-98.000000	0.9954211	42718.1499
## 548	548	21232.0	21225.10	-72.400391	0.9966016	18269.5236
## 549	549	21493.2	21277.50	261.199219	1.0123021	16291.3166
## 550	550	21581.7	21359.96	88.500000	1.0041176	23443.8596
## 551	551	21461.8	21389.41	-119.898438	0.9944444	18512.8647
## 552	552	21180.8	21379.47	-281.000000	0.9869070	17414.1224
## 553	553	21187.8	21348.81	7.000000	1.0003305	21331.2430
## 554	554	21468.8	21372.30	281.000000	1.0132623	26270.0678
## 555	555	21771.2	21449.33	302.398438	1.0140855	27697.2412
## 556	556	21818.5	21495.80	47.300781	1.0021726	44014.3364
## 557	557	22009.1	21556.86	190.599609	1.0087357	63888.6045
## 558	558	22074.4	21644.37	65.300782	1.0029670	102222.2298
## 559	559	21932.2	21751.71	-142.201172	0.9935581	136422.8593
## 560	560	21937.9	21858.87	5.701172	1.0002599	100971.1374

## 561	561	22005.9	21935.60	68.000000	1.0030997	40352.5267
## 562	562	21977.8	21965.11	-28.099610	0.9987231	11727.7950
## 563	563	22087.2	22003.50	109.398438	1.0049777	6503.7269
## 564	564	22076.0	22013.06	-11.199219	0.9994930	3686.1837
## 565	565	21890.2	21986.74	-185.800781	0.9915836	4450.4360
## 566	566	21953.0	21989.71	62.800781	1.0028689	5531.0932
## 567	567	22085.6	22010.81	132.599609	1.0060402	5214.7209
## 568	568	21930.8	22000.09	-154.798828	0.9929910	5780.2006
## 569	569	21788.6	21973.06	-142.201172	0.9935159	6708.9157
## 570	570	21834.9	21937.01	46.300782	1.0021250	13228.2264
## 571	571	21874.4	21908.21	39.500000	1.0018090	12722.4320
## 572	572	21790.5	21893.97	-83.900391	0.9961644	9188.6638
## 573	573	21715.4	21860.03	-75.099609	0.9965536	11207.3505
## 574	574	21838.0	21824.66	122.599609	1.0056457	14597.1005
## 575	575	21855.7	21813.93	17.699219	1.0008105	4737.9521
## 576	576	21878.4	21826.76	22.701172	1.0010387	2886.5226
## 577	577	22018.8	21853.03	140.400390	1.0064173	3280.3615
## 578	578	21998.4	21870.74	-20.400390	0.9990735	8610.8730
## 579	579	21650.4	21850.73	-348.000000	0.9841807	11690.8060
## 580	580	21186.4	21775.16	-464.000000	0.9785685	18242.1306
## 581	581	21011.9	21657.14	-174.500000	0.9917636	82082.3249
## 582	582	20690.8	21490.73	-321.099610	0.9847182	162269.0756
## 583	583	20744.2	21328.70	53.398438	1.0025808	279025.3337
## 584	584	21121.1	21200.46	376.900390	1.0181690	316232.7651
## 585	585	20762.0	21023.83	-359.099609	0.9829981	224855.3522
## 586	586	20692.2	20886.94	-69.800781	0.9966381	114380.0104
## 587	587	20905.3	20846.79	213.101562	1.0102986	45416.9745
## 588	588	21185.0	20871.51	279.699219	1.0133793	28645.9788
## 589	589	20696.2	20872.29	-488.800781	0.9769270	42453.5705
## 590	590	20633.3	20856.44	-62.898438	0.9969609	42132.5437
## 591	591	19999.7	20696.24	-633.601562	0.9692923	48624.3208
## 592	592	19890.1	20571.69	-109.599610	0.9945199	129343.9766
## 593	593	19837.3	20449.56	-52.798828	0.9973455	218834.1883
## 594	594	19699.1	20277.24	-138.201172	0.9930333	288899.2058
## 595	595	20099.8	20122.21	400.701172	1.0203411	313505.6200
## 596	596	20206.4	20052.24	106.599610	1.0053035	153376.5623
## 597	597	20491.0	20031.91	284.599609	1.0140846	93936.0215
## 598	598	20101.4	20046.44	-389.599609	0.9809868	69267.1514
## 599	599	20181.9	20088.13	80.500000	1.0040047	69652.6360
## 600	600	20197.6	20139.60	15.699218	1.0007779	66609.5435
## 601	601	20286.2	20223.47	88.599610	1.0043866	55030.2187
## 602	602	20383.8	20264.04	97.601562	1.0048112	18065.1670
## 603	603	20532.2	20310.59	148.398438	1.0072802	17879.9542
## 604	604	20748.6	20347.39	216.400390	1.0105396	26783.5465
## 605	605	20919.4	20464.24	170.800782	1.0082319	51754.7523
## 606	606	20729.3	20542.44	-190.099610	0.9909128	80271.9275
## 607	607	20713.7	20616.17	-15.601562	0.9992474	71560.5634
## 608	608	21031.8	20722.69	318.101562	1.0153571	50287.3426
## 609	609	20790.7	20780.81	-241.101562	0.9885363	47695.4896
## 610	610	20819.1	20821.80	28.400390	1.0013660	25383.8919
## 611	611	20928.2	20847.46	109.099610	1.0052404	13366.8161
## 612	612	20792.4	20829.31	-135.798828	0.9935112	13592.5684
## 613	613	20563.9	20805.69	-228.500000	0.9890104	12851.1090
## 614	614	20274.8	20742.99	-289.099610	0.9859414	22273.3779

## 615	615	19742.6	20558.81	-532.201172	0.9737506	63249.7639
## 616	616	19548.5	20381.36	-194.099609	0.9901685	176570.4512
## 617	617	19611.6	20208.86	63.099609	1.0032278	300991.6297
## 618	618	19004.1	19933.99	-607.500000	0.9690234	333094.0370
## 619	619	18930.5	19668.00	-73.599609	0.9961272	400612.0023
## 620	620	19183.6	19470.81	253.099609	1.0133699	363090.1722
## 621	621	19257.3	19325.46	73.701172	1.0038419	223061.9186
## 622	622	19004.0	19219.94	-253.300781	0.9868465	98277.3538
## 623	623	18717.1	19101.17	-286.900391	0.9849032	73509.6744
## 624	624	19062.9	19022.79	345.800782	1.0184751	81202.1385
## 625	625	19258.3	19059.10	195.400390	1.0102503	30855.0557
## 626	626	19222.7	19100.84	-35.601562	0.9981514	38502.8890
## 627	627	19078.6	19085.84	-144.099610	0.9925037	38174.4638
## 628	628	18861.4	19029.29	-217.199218	0.9886156	36852.9794
## 629	629	19028.9	19032.84	167.500000	1.0088806	36617.2508
## 630	630	18834.2	19049.57	-194.701172	0.9897681	36495.9517
## 631	631	18729.7	19001.97	-104.500000	0.9944516	26130.3818
## 632	632	19063.2	18974.10	333.500000	1.0178059	40510.4047
## 633	633	19022.9	18945.56	-40.298828	0.9978860	29278.1110
## 634	634	18816.8	18908.16	-206.099610	0.9891657	18424.2701
## 635	635	18678.6	18882.04	-138.201172	0.9926554	16605.3624
## 636	636	18615.2	18822.94	-63.400390	0.9966057	24228.1482
## 637	637	18329.1	18750.79	-286.099610	0.9846309	28426.2223
## 638	638	18394.5	18702.90	65.400391	1.0035681	62977.4879
## 639	639	18595.6	18636.10	201.099609	1.0109326	81384.7323
## 640	640	18937.7	18623.93	342.099610	1.0183968	56461.7426
## 641	641	19020.7	18653.06	83.000000	1.0043828	46513.4915
## 642	642	19062.9	18707.96	42.201172	1.0022187	65561.5159
## 643	643	18982.9	18760.49	-80.000000	0.9958034	89931.7327
## 644	644	19104.5	18871.26	121.599609	1.0064057	97877.5937
## 645	645	18972.7	18953.86	-131.800781	0.9931011	72270.9188
## 646	646	19254.6	19048.00	281.900390	1.0148582	28143.2728
## 647	647	19456.7	19122.14	202.099610	1.0104962	11486.2386
## 648	648	19692.9	19218.17	236.201172	1.0121398	30884.3946
## 649	649	19505.3	19281.37	-187.599610	0.9904737	72704.9104
## 650	650	19545.9	19361.80	40.599610	1.0020815	77767.3336
## 651	651	19577.0	19429.30	31.099609	1.0015911	67035.5651
## 652	652	19620.1	19521.79	43.099609	1.0022015	58404.5738
## 653	653	19669.2	19581.01	49.099610	1.0025025	19745.4015
## 654	654	19578.3	19598.39	-90.898438	0.9953786	7376.4360
## 655	655	19885.9	19625.96	307.599610	1.0157113	4449.8895
## 656	656	19991.9	19695.47	106.000000	1.0053304	15851.6087
## 657	657	20179.8	19786.03	187.900390	1.0093988	30106.7325
## 658	658	20180.6	19872.26	0.798828	1.0000396	55906.5727
## 659	659	20270.0	19965.10	89.400391	1.0044300	65897.5160
## 660	660	20181.4	20038.27	-88.599609	0.9956290	71610.3773
## 661	661	20265.4	20136.43	84.000000	1.0041622	58568.6837
## 662	662	20111.4	20168.64	-154.000000	0.9924008	20663.7524
## 663	663	19974.9	20166.21	-136.500000	0.9932128	9096.6846
## 664	664	19985.4	20138.44	10.500000	1.0005257	10139.5126
## 665	665	20021.4	20115.70	36.000000	1.0018013	14657.9114
## 666	666	20172.3	20101.74	150.900390	1.0075370	16041.4432
## 667	667	19873.3	20057.73	-299.000000	0.9851777	12380.0487
## 668	668	19836.1	19996.40	-37.201172	0.9981281	17760.0433



## 669	669	19512.9	19910.90	-323.199218	0.9837065	14370.6753
## 670	670	19330.8	19818.89	-182.099610	0.9906677	42599.9253
## 671	671	19142.7	19698.50	-188.101562	0.9902693	88125.4632
## 672	672	19270.9	19591.29	128.201172	1.0066971	142800.8744
## 673	673	19088.2	19436.41	-182.701172	0.9905193	142486.3512
## 674	674	19241.4	19346.14	153.201172	1.0080260	100423.2711
## 675	675	19413.0	19285.70	171.599609	1.0089182	65442.9534
## 676	676	19773.3	19322.90	360.300781	1.0185598	21916.1090
## 677	677	19987.2	19416.67	213.898438	1.0108175	51324.0366
## 678	678	19645.4	19488.49	-341.798828	0.9828991	114603.9717
## 679	679	19726.1	19553.51	80.699218	1.0041078	104796.4832
## 680	680	19560.2	19620.94	-165.900390	0.9915898	101382.4890
## 681	681	19385.9	19641.59	-174.298828	0.9910891	59999.2130
## 682	682	19562.4	19662.93	176.500000	1.0091046	44700.8131
## 683	683	19368.7	19605.13	-193.701172	0.9900983	36505.8570
## 684	684	19184.5	19490.46	-184.199219	0.9904899	45006.3282
## 685	685	19002.7	19398.64	-181.800781	0.9905236	34823.5750
## 686	686	18481.0	19220.77	-521.699219	0.9725460	60638.7387
## 687	687	18327.0	19044.60	-154.000000	0.9916671	146200.7750
## 688	688	18307.9	18890.60	-19.099609	0.9989578	223927.6518
## 689	689	18648.9	18760.10	341.000000	1.0186258	267299.0046
## 690	690	18441.8	18627.69	-207.099610	0.9888948	181947.5016
## 691	691	18444.2	18521.93	2.398438	1.0001301	116645.2998
## 692	692	18881.2	18504.57	437.000000	1.0236931	57534.1552
## 693	693	19371.0	18631.71	489.800781	1.0259412	40171.8369
## 694	694	19235.1	18761.44	-135.900391	0.9929843	146336.1226
## 695	695	18979.0	18857.31	-256.099609	0.9866858	171905.5622
## 696	696	18583.1	18847.91	-395.900391	0.9791401	134787.4249
## 697	697	18216.7	18815.76	-366.400390	0.9802831	139977.2229
## 698	698	18206.3	18781.77	-10.398438	0.9994292	177688.1408
## 699	699	18613.6	18743.54	407.298828	1.0223713	215237.5506
## 700	700	18326.4	18594.31	-287.199218	0.9845705	216598.5206
## 701	701	18621.0	18506.59	294.599609	1.0160751	154002.0159
## 702	702	18798.2	18480.76	177.199219	1.0095161	76707.3680
## 703	703	18674.4	18493.80	-123.798828	0.9934143	52906.2534
## 704	704	18579.3	18545.60	-95.099610	0.9949075	57211.7408
## 705	705	18861.0	18639.13	281.699219	1.0151620	42502.1974
## 706	706	18918.4	18682.67	57.400391	1.0030433	29688.8592
## 707	707	19097.0	18792.76	178.599609	1.0094405	40367.0353
## 708	708	19279.8	18886.87	182.800781	1.0095722	33684.8502
## 709	709	19352.1	18966.00	72.298828	1.0037500	57969.5508
## 710	710	19471.2	19079.83	119.099610	1.0061544	85427.0298
## 711	711	19426.1	19200.80	-45.099610	0.9976838	98676.5524
## 712	712	19517.7	19294.61	91.599610	1.0047153	59832.7276
## 713	713	19277.0	19345.84	-240.699219	0.9876676	47058.3032
## 714	714	19241.2	19366.44	-35.800781	0.9981428	20458.7970
## 715	715	19449.8	19390.73	208.601562	1.0108414	11468.3137
## 716	716	19545.9	19418.41	96.099610	1.0049409	10687.1864
## 717	717	19660.3	19445.43	114.400390	1.0058529	13557.3018
## 718	718	19344.3	19433.74	-316.000000	0.9839270	21993.0394
## 719	719	19990.4	19501.27	646.099610	1.0334000	23475.9323
## 720	720	20111.5	19620.49	121.099609	1.0060579	68625.5768
## 721	721	19921.8	19717.71	-189.699219	0.9905676	105724.9694
## 722	722	19994.8	19795.57	73.000000	1.0036643	85851.3025

## 723	723	19958.0	19854.44	-36.800781	0.9981595	79612.3906
## 724	724	19884.6	19886.49	-73.400391	0.9963223	69576.7380
## 725	725	19980.9	19977.43	96.300782	1.0048430	62248.5581
## 726	726	19977.1	19975.53	-3.800782	0.9998098	5091.0667
## 727	727	20220.0	19991.03	242.900391	1.0121589	5058.8291
## 728	728	20282.3	20042.53	62.300781	1.0030811	11658.2064
## 729	729	20344.1	20092.43	61.798828	1.0030469	21905.0635
## 730	730	20383.8	20153.26	39.701172	1.0019515	33777.9099
## 731	731	20220.5	20201.24	-163.300781	0.9919887	40598.8804
## 732	732	20277.4	20243.60	56.900391	1.0028140	26636.5834
## 733	733	20453.3	20311.63	175.900390	1.0086747	17418.2793
## 734	734	20525.5	20355.27	72.199219	1.0035300	7511.0184
## 735	735	20485.7	20384.33	-39.800781	0.9980609	11513.0343
## 736	736	20242.3	20369.79	-243.398438	0.9881186	12475.7718
## 737	737	19990.2	20313.56	-252.101562	0.9875458	15321.2914
## 738	738	19973.2	20278.23	-17.000000	0.9991496	35614.2853
## 739	739	19969.2	20234.20	-4.000000	0.9997997	52022.1355
## 740	740	19947.1	20161.89	-22.099610	0.9988933	65676.9208
## 741	741	20019.7	20089.63	72.599610	1.0036396	65312.8534
## 742	742	20023.5	20023.60	3.800781	1.0001899	40555.1000
## 743	743	19891.7	19973.51	-131.800781	0.9934177	10052.1439
## 744	744	19600.6	19917.86	-291.099610	0.9853658	2053.3610
## 745	745	19443.3	19842.16	-157.298828	0.9919748	21570.4463
## 746	746	19200.8	19732.39	-242.500000	0.9875278	51908.3146
## 747	747	19306.9	19640.93	106.099610	1.0055258	103716.6074
## 748	748	19571.1	19576.84	264.199218	1.0136842	116447.4142
## 749	749	19349.7	19480.59	-221.400390	0.9886874	88557.4274
## 750	750	19506.7	19425.59	157.000000	1.0081138	53096.3425
## 751	751	19284.1	19380.37	-222.599610	0.9885886	21511.7689
## 752	752	19485.9	19386.46	201.800782	1.0104646	17358.1186
## 753	753	19384.9	19412.76	-101.000000	0.9948168	18510.9547
##	deviations	money_in	money_out			
## 1	0.0000000000	0.0000000	1.0000000			
## 2	0.0000000000	0.0000000	1.0000000			
## 3	0.0000000000	0.0000000	1.0000000			
## 4	0.0000000000	0.0000000	1.0000000			
## 5	0.0000000000	0.0000000	1.0000000			
## 6	0.0000000000	0.0000000	1.0000000			
## 7	0.0000000000	0.0000000	1.0000000			
## 8	1.6819804822	0.0000000	1.0000000			
## 9	1.6441352043	0.0000000	1.0000000			
## 10	1.7741526976	0.0000000	1.0000000			
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## 13	1.4243299203	0.0000000	1.0000000			
## 14	0.7715300420	0.0000000	1.0000000			
## 15	0.7517174511	0.0000000	1.0000000			
## 16	0.7407189149	0.0000000	1.0000000			
## 17	-0.0837340325	0.0000000	1.0000000			
## 18	-2.7821049638	0.0000000	1.0000000			
## 19	-0.9603811383	0.0000000	1.0000000			
## 20	-0.5212912835	0.0000000	1.0000000			
## 21	-0.6798410746	0.0000000	1.0000000			
## 22	-2.7111849558	0.0000000	1.0000000			

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## 23 -0.8200597332 0.0000000 1.0000000
## 24 0.7280989321 0.0000000 1.0000000
## 25 2.2597618354 1.0000000 0.0000000
## 26 2.2512101471 1.0059995 0.0000000
## 27 0.7833643106 1.0002210 0.0000000
## 28 1.0518456857 1.0050420 0.0000000
## 29 0.7939787711 1.0071098 0.0000000
## 30 0.8860779607 1.0102711 0.0000000
## 31 0.6877875666 1.0096082 0.0000000
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## 38 -4.4490218052 0.0000000 0.9949636
## 39 -2.0938401473 0.0000000 0.9949636
## 40 -1.9836681475 0.0000000 0.9949636
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## 42 -0.7696525572 0.0000000 0.9949636
## 43 -0.7079779358 0.0000000 0.9949636
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## 77 -0.9755348157 0.0000000 0.9949636
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## 740 -0.8381061003 0.0000000 1.0208924
## 741 -0.2736258094 0.0000000 1.0208924
## 742 -0.0004946269 0.0000000 1.0208924
## 743 -0.8160197736 0.0000000 1.0208924
## 744 -7.0012973814 0.0000000 1.0208924
## 745 -2.7157300258 0.0000000 1.0208924
## 746 -2.3332114970 0.0000000 1.0208924
## 747 -1.0371915183 0.0000000 1.0208924
## 748 -0.0168304942 0.0000000 1.0208924
## 749 -0.4398272750 0.0000000 1.0208924
## 750 0.3520149940 0.0000000 1.0208924
## 751 -0.6563883529 0.0000000 1.0208924
## 752 0.7547870902 0.0000000 1.0208924
## 753 -0.2047450727 0.0000000 1.0208924
```