

**CS677 HW 1**  
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**Question 1**

1. 2016

Day	$\mu(R)$	$\sigma(R)$	$ R^- $	$\mu(R^-)$	$\sigma(R^-)$	$ R^+ $	$\mu(R^+)$	$\sigma(R^+)$
Monday	0.0049	0.0262	19	-0.0175	0.0206	27	0.0207	0.0163
Tuesday	-0.0009	0.0218	31	-0.0142	0.0151	21	0.0188	0.0138
Wednesday	-0.002	0.0286	25	-0.0221	0.023	27	0.0166	0.0191
Thursday	-0.0021	0.0228	28	-0.0182	0.0146	23	0.0175	0.0135
Friday	0.0011	0.0203	22	-0.0168	0.0167	29	0.0147	0.0091

2017

Day	$\mu(R)$	$\sigma(R)$	$ R^- $	$\mu(R^-)$	$\sigma(R^-)$	$ R^+ $	$\mu(R^+)$	$\sigma(R^+)$
Monday	0.0033	0.0258	24	-0.0159	0.0122	22	0.0242	0.0194
Tuesday	0.0065	0.022	20	-0.0151	0.0118	31	0.0204	0.0144
Wednesday	-0.001	0.0213	28	-0.0161	0.016	24	0.0167	0.0101
Thursday	-0.0027	0.0249	26	-0.02	0.0202	25	0.0153	0.0143
Friday	0.0028	0.0161	19	-0.0122	0.0114	32	0.0117	0.0112

2018

Day	$\mu(R)$	$\sigma(R)$	$ R^- $	$\mu(R^-)$	$\sigma(R^-)$	$ R^+ $	$\mu(R^+)$	$\sigma(R^+)$
Monday	0.0032	0.0413	24	-0.0254	0.0194	24	0.0319	0.0374
Tuesday	0.003	0.0387	27	-0.0236	0.0197	24	0.033	0.0325
Wednesday	0.0064	0.0322	22	-0.0198	0.0164	28	0.0271	0.0258
Thursday	-0.0015	0.0382	34	-0.0202	0.0193	17	0.0359	0.0395
Friday	-0.0063	0.0336	26	-0.029	0.0311	25	0.0174	0.0142

2019

Day	$\mu(R)$	$\sigma(R)$	$ R^- $	$\mu(R^-)$	$\sigma(R^-)$	$ R^+ $	$\mu(R^+)$	$\sigma(R^+)$
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Monday	0.0052	0.0269	21	-0.0198	0.0145	27	0.0246	0.0158
Tuesday	0.0027	0.0226	26	-0.0133	0.0162	26	0.0187	0.0159
Wednesday	0.0018	0.0266	25	-0.0187	0.0199	26	0.0214	0.0148
Thursday	0.002	0.041	21	-0.0279	0.0314	29	0.0236	0.0329
Friday	-0.0044	0.0352	27	-0.0259	0.0313	24	0.0197	0.0208

2020

Day	$\mu(R)$	$\sigma(R)$	$ R- $	$\mu(R-)$	$\sigma(R-)$	$ R+ $	$\mu(R+)$	$\sigma(R+)$
Monday	0.0316	0.0711	17	-0.0393	0.0506	31	0.0705	0.0463
Tuesday	0.0097	0.0569	21	-0.0368	0.0443	31	0.0412	0.0407
Wednesday	0.0053	0.0575	20	-0.0466	0.0489	32	0.0378	0.0338
Thursday	0.0055	0.0512	21	-0.0389	0.0341	30	0.0365	0.0361
Friday	-0.0011	0.0366	28	-0.0246	0.024	21	0.0304	0.025

2. See tables above
3. There are more days with non-negative returns for 2016 (125 vs 127)  
There are more days with non-negative returns for 2017 (117 vs 134)  
There are more days with negative returns for 2018 (133 vs 118)  
There are more days with non-negative returns for 2019 (120 vs 132)  
There are more days with non-negative returns for 2020 (107 vs 145)

Overall, there are more days with **non-negative** returns (607 vs 656)

4. My stock gains more on an “up” day since the mean is more frequently positive
5. Across all days of the week, my stock gains are sometimes more on an “up” day, but sometimes it is also more down on a “down” day. The actual amount it being up/down varies based on the day. For 2016, 2017, 2018, 2019, and 2020, the net gain was positive for the year. For 2016, there were more days of a net loss, but the net gains ended up being a higher amount, resulting in an overall net gain for the year.

## Question 2

1. For most of the years, it looks like the majority of losses happen near the end of the week on Thursday or Friday. Also, Monday has always had a positive gain and usually the day with the most gain. This could be because of the usual loss on Friday so it provides a larger difference over the weekend.

2. If money was invested on Monday, there would always be a gain for all the years. There are no other clear patterns for the other days. But, investing on Thursday or Friday may have a historically higher chance of having a loss.
3. The best day is Monday (+0.0096), the worst day is Friday (-0.0016)
4. These days do change year to year. The best day is not always Monday in a year and the worst day is not always Friday. For example, sometimes Wednesday can be the best day, and Thursday can be the worst.

### Question 3

#### TSLA

Day	$\mu(R)$	$\sigma(R)$	$ R_- $	$\mu(R_-)$	$\sigma(R_-)$	$ R_+ $	$\mu(R_+)$	$\sigma(R_+)$
Monday	0.0097	0.0433	105	-0.0229	0.0262	131	0.0359	0.0359
Tuesday	0.0042	0.0352	125	-0.02	0.0245	133	0.0269	0.0278
Wednesday	0.0021	0.0355	120	-0.0237	0.028	137	0.0246	0.0242
Thursday	0.0002	0.037	130	-0.024	0.0246	124	0.0256	0.0301
Friday	-0.0016	0.0295	122	-0.0225	0.0253	131	0.0179	0.0172

#### SPY

Day	$\mu(R)$	$\sigma(R)$	$ R_- $	$\mu(R_-)$	$\sigma(R_-)$	$ R_+ $	$\mu(R_+)$	$\sigma(R_+)$
Monday	0	0.0086	130	-0.0063	0.0077	154	0.0054	0.0048
Tuesday	0.0006	0.0078	138	-0.0057	0.0056	172	0.0056	0.0052
Wednesday	0.001	0.0083	131	-0.0054	0.006	178	0.0057	0.0064
Thursday	0.0005	0.0079	139	-0.0055	0.0065	165	0.0056	0.0048
Friday	0.0003	0.0086	134	-0.0064	0.0072	169	0.0057	0.0053

1. For TSLA, the best day of the week is Monday and the worst is Friday.  
For SPY, the best day of the week is Wednesday, and the worst is Monday.
2. These days are not the same for TSLA and SPY. Monday is actually the opposite performing for each.

#### Question 4

Trading only on positive days:

1. For TSLA, I would have \$1,837,161,973.47
2. For SPY, I would have \$10,486.90

#### Question 5

Buying and Holding (Trading everyday):

1. For TSLA, I would have \$1554.94
2. For SPY, I would have \$197.97

#### Question 6

1. Oracle misinformation results
  - a. Wrong results for the best 10 trading days
    - i. TSLA: \$418,321,607.25
    - ii. SPY: \$7,841.71
  - b. Wrong results for worst 10 trading days
    - i. TSLA: \$353,994,982.74
    - ii. SPY: \$7,406.08
  - c. Wrong results for best 5 days and for the worst 5 days
    - i. TSLA: \$310,221,287.64
    - ii. SPY: \$7,278.48
2. You gain more by missing the worst days. However, if the question was asking if you gain more by taking the worst days then I would say you gain more by missing the best days. This is because missing the best 10 days resulted in an overall higher gain than taking the worst 10 days. The return for the worst days was much lower than the positive counterpart of the best days.
3. The results in part c are much lower than the results in number 4. Missing the best 5 days and taking the worst 5 days leads to a significant loss in profit compared to taking all the positive trades. This makes sense because you miss out on potential gains as well as take on extra losses, resulting in overall loss.