

# Question 1

Q1 1. Below table

Q1 2. Below table

Ticker: KO

Year: 2016

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | 0.149314  | 0.506608    | 16     | -0.501693 | 0.530399     | 29     | 0.508490  | 0.493483     |
| Tuesday   | 0.064827  | 0.704797    | 24     | -0.641325 | 0.750219     | 28     | 0.670100  | 0.665865     |
| Wednesday | -0.290084 | 1.149658    | 28     | -0.904842 | 1.864469     | 24     | 0.427133  | 0.315712     |
| Thursday  | 0.010571  | 0.646628    | 27     | -0.520618 | 0.693796     | 24     | 0.608158  | 0.593564     |
| Friday    | 0.063655  | 1.038671    | 23     | -0.767432 | 1.235003     | 28     | 0.746333  | 0.877398     |

Year: 2017

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | 0.021844  | 0.195298    | 19     | -0.407925 | 0.250043     | 27     | 0.324274  | 0.156774     |
| Tuesday   | 0.237938  | 0.357174    | 21     | -0.307540 | 0.155129     | 30     | 0.619772  | 0.498606     |
| Wednesday | 0.036648  | 0.364258    | 22     | -0.480565 | 0.454493     | 30     | 0.415937  | 0.298085     |
| Thursday  | -0.071786 | 0.481197    | 24     | -0.651623 | 0.644072     | 27     | 0.443625  | 0.336420     |
| Friday    | -0.016444 | 0.241812    | 22     | -0.418211 | 0.409374     | 29     | 0.288344  | 0.114696     |

Year: 2018

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | -0.144145 | 1.238671    | 23     | -0.968013 | 1.953893     | 25     | 0.613813  | 0.580666     |
| Tuesday   | 0.014040  | 0.889686    | 24     | -0.777373 | 1.000076     | 27     | 0.717519  | 0.791562     |
| Wednesday | -0.065987 | 0.836864    | 29     | -0.701543 | 0.728875     | 21     | 0.811685  | 0.985992     |
| Thursday  | 0.013746  | 0.875465    | 28     | -0.604560 | 0.871150     | 23     | 0.766466  | 0.880717     |
| Friday    | 0.256998  | 0.751257    | 19     | -0.553322 | 0.530307     | 32     | 0.738125  | 0.882447     |

Year: 2019

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | -0.027366 | 0.712573    | 26     | -0.613000 | 0.538510     | 22     | 0.664747  | 0.918285     |
| Tuesday   | 0.174482  | 1.207774    | 23     | -0.552189 | 0.444665     | 29     | 0.750807  | 1.812998     |
| Wednesday | 0.098755  | 1.001198    | 21     | -0.838702 | 1.245627     | 30     | 0.754975  | 0.830097     |
| Thursday  | 0.011850  | 2.060123    | 22     | -0.936520 | 3.741731     | 28     | 0.756998  | 0.738859     |
| Friday    | 0.072673  | 0.846207    | 23     | -0.735537 | 0.766351     | 28     | 0.736560  | 0.911803     |

Year: 2020

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | 0.020299  | 6.699244    | 25     | -1.750983 | 5.988828     | 23     | 1.945606  | 7.471436     |
| Tuesday   | 0.341072  | 2.617717    | 26     | -0.816772 | 1.174113     | 26     | 1.498916  | 4.061320     |
| Wednesday | 0.022822  | 4.343922    | 24     | -1.604049 | 4.575482     | 28     | 1.417283  | 4.145442     |
| Thursday  | -0.337932 | 6.496025    | 26     | -1.850252 | 9.182079     | 25     | 1.234879  | 3.702528     |
| Friday    | 0.034772  | 3.669730    | 20     | -1.484292 | 5.739413     | 29     | 1.082403  | 2.242363     |

Q1 3. There are more days with non-negative returns

Q1 4. The stock gain more on a "up" day than it loses on "down" days. The mean of the returns are positive for the stock KO.

Q1 5. No there are not same.

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## Question 2

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Q2 1. The pattern seems random to me.

Q2 2. There is an increasing trend for gains on Monday, Tuesday, Thursday across the years.

Q2 3. 2016 - Monday, 2017 - Tuesday, 2018 - Friday, 2019 - Tuesday, 2020 - Tuesday

Q2 4. They changed randomly from 2016 to 2018 and remained Tuesday on 2019 and 2020.

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Ticker: SPY Aggregate Result

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | 0.051077  | 1.946591    | 99     | -0.861272 | 2.932780     | 136    | 0.715213  | 1.228704     |
| Tuesday   | 0.121495  | 1.329133    | 112    | -0.670917 | 0.931056     | 146    | 0.729372  | 1.634508     |
| Wednesday | 0.090629  | 1.243707    | 106    | -0.736878 | 1.568409     | 151    | 0.671527  | 1.015770     |
| Thursday  | -0.002139 | 1.363386    | 117    | -0.713607 | 2.056673     | 137    | 0.605465  | 0.771308     |
| Friday    | 0.017670  | 1.289376    | 116    | -0.759443 | 1.310506     | 137    | 0.675665  | 1.271485     |

Ticker: KO Aggregate Result

|           | $\mu(R)$  | $\sigma(R)$ | $ R- $ | $\mu(R-)$ | $\sigma(R-)$ | $ R+ $ | $\mu(R+)$ | $\sigma(R+)$ |
|-----------|-----------|-------------|--------|-----------|--------------|--------|-----------|--------------|
| Monday    | 0.001982  | 1.902147    | 109    | -0.896831 | 2.035768     | 126    | 0.779526  | 1.786554     |
| Tuesday   | 0.166786  | 1.159554    | 118    | -0.630877 | 0.728975     | 140    | 0.839101  | 1.522470     |
| Wednesday | -0.039902 | 1.546739    | 124    | -0.906150 | 1.768638     | 133    | 0.767728  | 1.339855     |
| Thursday  | -0.075051 | 2.112091    | 127    | -0.908136 | 2.989249     | 127    | 0.758034  | 1.234934     |
| Friday    | 0.082707  | 1.290878    | 107    | -0.784747 | 1.681322     | 146    | 0.718443  | 1.004730     |

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## Question 3

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Q3 1. SPY best day - Tuesday, worst day - Thursday \ and KO best day - Tuesday, worst day - Thursday

Q3 2. Yes there are the same for the KO and SPY stocks

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## Question 4

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Q4 1. KO stock - 17052.90005030229

Q4 2. SPY stock - 11725.864387233782

SPY Stock Last trading day remaining amount: 11725.864387233782 \ KO Stock Last trading day remaining amount: 17052.90005030229

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## Question 5

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Q5 1. KO stock - 128.39622641509433\ SPY stock - 185.05123868271812

Q5 2. There is a massive difference in the profit generated by buy and hold strategy. The buy and hold strategy resulted in a very small gain

SPY Stock buy and hold strategy remaining amount: 185.05123868271812\ KO Stock buy and hold strategy remaining amount: 128.39622641509433

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## Question 6

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Q6 1. a. KO - 3628.2399093272875\ SPY - 2931.359236120347

b. KO - 12334.855708824556\ SPY - 8264.83161619305

c. KO - 11542.098846901674\ SPY - 7117.842265760002

Q6 2. We gain more by missing the worst days.

Q6 3. Yes the results are different compared to the results in question 4

SPY Stock best ten days loss remaining amount: 2931.359236120347\ KO Stock best ten days loss remaining amount: 3628.2399093272875

SPY Stock worst ten days loss remaining amount: 8264.83161619305\ KO Stock worst ten days loss remaining amount: 12334.855708824556

SPY Stock best five days and worst five days loss remaining amount: 7117.842265760002\ KO Stock best five days and worst five days loss remaining amount: 11542.098846901674