1. After reading the paper, explain the trading strategy in your own words.

There are two stages in paper's implementation of the pairs trading strategy. Stage one is the formation period and the stage two is the trading period. In the paper, twelve months and six months were arbitrarily chosen for the duration of the formation and trading periods respectively.

During the formation period, pairs are formed by matching in normalized daily "price" space, where prices includes reinvested dividends. During this formation period, traders are looking for two stocks whose prices move together. The approach this paper took in finding stocks that move together is:

a) Finding the stocks that move together
- Screen out all stocks from the Center for Research in Security Prices Database (CSRP - http://www.crsp.com/)
  daily files one or more days of no trade in order to identify liquid stocks and facilitate pairs formation.
- Over the formation period construct a cumulative total return index for each stock.
- Match up partners for each stock by finding security that minimizes the sum of squared deviations between the
  two normalized prices series. Prices includes reinvested dividends.

Once stocks that move together are found and paired in the formation period, we move on to the trading period.
This is when we the pairs open or close a long-short position. The approach this paper took is:

b) When to long and short the stocks.
- After the formation period, when all liquid stocks are paired up, the top 5 and 20 pairs with the smallest
  historical distance measure and the 20 pairs after the top 100 (i.e. pairs 101 - 120) are examined. Though,
  it may seem odd to look at the set of 20 pairs after the top 100 but the intuition is that the top
  pairs share certain characteristics not necessarily present in the the 20 pairs after the top 100 set.
- During the trading period the pair can be open or closed. During "pair open", we take long-short position when
  pair prices have diverged by a certain amount. During "pair close" we close the position when the prices
  have reverted.
- The rules for opening and closing positions are based on a standard deviation metric.
- When the prices diverge by more than two historical standard deviations, we open a position.
- When the long-short position is open, at the next crossing of the prices, we will close the position.
- If prices do not cross before the end of the trading period, gains or losses are calculated on the last
  day of the trading period.
- If a stock in a pair is delisted from CRSP, we close the position in that pair, using the delisting return,
  or last available price.
- The long-short position consist of: Long the losers and short the winner.
- During the trading period, there is no "leader", whoever is winning, short it and whoever is losing, long it.

It is worth noting that it is mentioned in the paper that the pairs strategy is not limited to just finding two stocks that move together, the idea can be extended to 2, 3, or N number of stocks; nor is the strategy limits the stocks being in the same industry categories. The stock pairs can be pairs from the entire univers of stocks. However, the intuition is that choosing pairs that have correlation (i.e. being of same/similar industries) is based on a rational explanation of why they "move together." Also, the duration of the stages (formation and trading) do not need to be twelve and six months exclusively. These were all decisions taken specific for the research done in this paper and not a limitation of the strategy. Their approach was inspired to best approximate how traders they interviewed choose pairs themselves.

#--------------------------------------

2. Pick a main industry in which you want to find a pair. Pick an industry which is related to this main industry.
   While picking the related industry, you might want to choose an industry which has similar trend as the main industry.
   In the example, steel and automobiles are related industries. When the price of steel increases, the price of automobiles
   also increases.

Picking industries based on the sectors and industries of the S&P 500 listed here (https://www.thebalance.com/what-are-the-sectors-and-industries-of-the-sandp-500-3957507)

a) Main industry mentioned
   Software Industry, i.e. Microsoft

b) Related industry mentioned
   Semiconductors & Semiconductor Equipment Industry, i.e. Intel

c) Relation between industries mentioned
   Software and hardware go hand in hand in the computing world. Usually, a company specializes in software
   and another company specializes in hardware. They are both needed hence a strong alliance is usually formed.

   An example of the past would be Microsoft, software company in the software industry, developped the operating system.
   They had strong relations with IBM, a hardware company, that manufactured the personal computer (PC,) and used almost
   exclusively Intel, of the Semiconductors & Semiconductor Equipment Industry, chipset.

   Microsoft have revolutionized home computing and made it mainstream with the introduction of the
   Windows 95 operating system. While Microsoft focused on the hardware side, For decades, the two giants worked hand in
   hand building the software and hardware platforms of personal computing and pushed their technology into virtually every home
   and business in the developed world and beyond.

   Another example would be Nvidia GPU's, Semiconductors & Semiconductor Equipment Industry, and any video game company or
   machine learning/deep learning oriented company, software industry. Both video

games and deep learning are gaining momentum
and rely heavily on GPu's.

Thus, it seems logical that there would be high correlation between the two industries (i.e. Microsoft and Intel.) When the
price of Microsoft increases, Intel price would likely increase.