Assignment 1:

Installation

1. Open a command prompt in the folder, and type ‘pip install –r requirements.txt’ to make sure that all the dependencies are installed

2. To run the file, on a command prompt type ‘python a1.py’

3. Please note: This script makes use of fix_yahoo_finance, which may bug out during execution and fetch blank dataframes. Please re-run the program

Explanation

1. **Download and calculate KPIs**

```
data = pdr.get_data_yahoo(['MMM', 'AXP', 'AAPL', 'BA', 'CAT', 'CVX', 'CSCO', 'KO', 'DIS', 'XOM',
                           'GE', 'GS', 'HD', 'IBM', 'INTC', 'JNJ', 'JPM', 'MCD', 'MRK', 'MSFT', 'NKE', 'PFE', 'PG',
                           'TRV', 'UTX', 'UNH', 'VZ', 'V', 'WMT'], start=start, end=end, auto_adjust=True)
```

```
[**********100%**********]  29 of 29 downloaded===== Average Monthly Return on Negative Month =====
AAPL    0.048981
AXP     0.035633
BA      0.046831
CAT     0.045593
CSCO    0.042943
CVX     0.039411
DIS     0.035915
GE      0.031682
GS      0.040221
HD      0.036154
IBM     0.028230
INTC    0.044987
JNJ     0.032855
JPM     0.036819
```

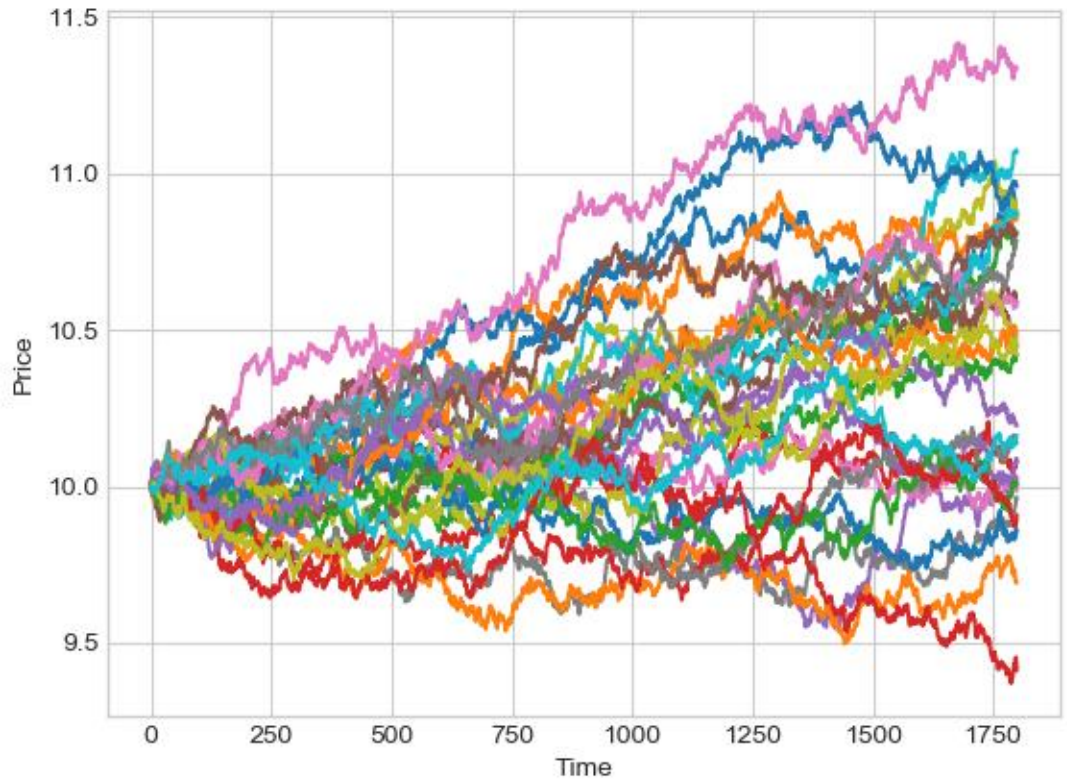
```
===== Average Monthly Return on Positive Month =====
AAPL   -0.041005
AXP    -0.036995
BA     -0.036178
CAT    -0.040099
CSCO   -0.024815
CVX    -0.033917
DIS    -0.041358
GE     -0.038749
GS     -0.038648
HD     -0.024335
IBM    -0.036379
```

The Averages are calculated by taking the monthly returns where the returns are greater than 0, which means that's a positive month, and where the returns are less than 0, means it is a negative month.

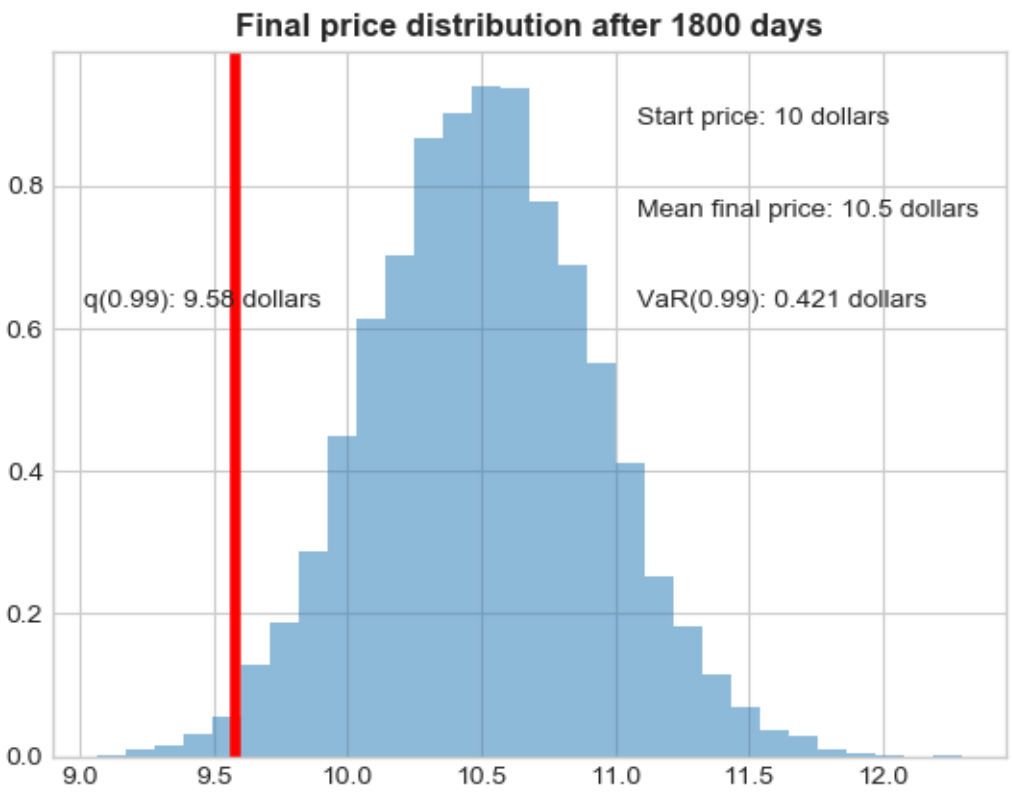
The probability of positive month is calculated as number of months upon total number of positive months

```
===== Porbability of a Positive Month =====
{'AXP': 0.639344262295082, 'BA': 0.7213114754098361, 'CVX': 0.5245901639344263, 'CSCO': 0.5573770491803278, '
```

2. **Create portfolio, run monte-carlo simulation**
   A 1.8k day monte carlo simulation is as follows:



Note: I couldn't get the simulations running properly for each portfolio, but I did manage to get a hacky monte-carlo running from a base price of 10 dollars.



Analysis:

Note: The analysis questions have been answered by reading the simulations on the forums and building upon it, since I could not get the portfolios simulation properly (though I could run a monte carlo simulation on a dummy price)

From the forums, I could gather the following points:

```
Portfolio index statistics (start=100):
----------------------------------------
DescribeResult(nobs=600L, minmax=(112.95557149653909, 443.84292566689328), mean=235.20148021392282,
variance=3189.6559701374367, skewness=0.6837805480359818, kurtosis=0.6046599164393736)


Portfolio CAGR return statistics:
----------------------------------------
DescribeResult(nobs=600L, minmax=(0.024664125613945043, 0.34724276627702677), mean=0.18123595315732233,
variance=0.0031459886595875293, skewness=0.12696304506424452, kurtosis=-0.0376064963141558)


Possiblity of achieving target cagr return of 25.0 % is 11.167 %
```

1. **Given the dimensions of the study, how likely is the trader to reach her goal of 25% CAGR from a portfolio based on solely DJIA stocks?**
   The possibility of reaching 25% CAGR isn't high, just around 12%.
2. **What the risks she is exposing herself to by following her investment strategy?**

If such a strategy is followed, she poses no losses in the near future. However, considering the 10% consecutive loss, the story speaks otherwise.

3. **Does such an investment strategy auger a favorable risk-return profile? How does the strategy stand up against downwards price shocks?**
   When simulated without shocks, yes, it does have a faorable risk-return profile. However, with shocks, we have the following case:

```
Portfolio index statistics (start=100):
----------------------------------------
DescribeResult(nobs=600L, minmax=(89.766804064155579, 359.1220493334643), mean=185.43276814458372,
variance=1945.11491681493, skewness=0.7064539217358331, kurtosis=0.7875910633495442)


Portfolio CAGR return statistics:
----------------------------------------
DescribeResult(nobs=600L, minmax=(-0.021359571945790967, 0.29136322376596491), mean=0.12648315593681608,
variance=0.0028040218282675625, skewness=0.12459534020604938, kurtosis=0.05419551120704913)


Possiblity of achieving target cagr return of 25.0 % is 1.667 %
```

   This shows that the possibility of achieving target cagr is 1.6%. and the min and max cgar are -0.2% t o 29% with an average of 12%. This means that there is a high possibility of loss.

4. **Considering all 1200 simulations, how bad would the trader be doing under the worst case scenario? In what Percentage of cases does she face risk of total ruin?**
   In around average of 12% of the cases she faces risk of total run