1. Calculation of Beta and Alpha

What is Beta?
Beta is another popular measure of the risk of a stock or a stock portfolio. For Stock-Trak’s purposes, we will only calculate Beta of the stocks (US and some int'l) in the open positions.
The Beta’s of individual stocks in the portfolio add up according to their weights to create the portfolio beta.

Calculation of Beta
There are two things that are used in the Portfolio Beta calculation:
1. The weight of the individual stock in the portfolio
2. The beta of the individual stock in the portfolio

The weight of the individual stock is calculated as follows (please note that a short position counts as a negative MV of Stock value):

Putting it together
Beta (portfolio) = [Weight (Stock A) X Beta (Stock A)] + [Weight (Stock B) X Beta (Stock B)] + … + [Weight (Stock n) X Beta (Stock n)]

Example of Beta Calculation – with just longs
Portfolio Value = $120,000
Market Value of Google in Open Positions: $40,000
Beta of Apple 1.22
Market Value of Apple in Open Positions: $30,000
Beta of Google: 1.13
- Weight of Apple: $40,000 / $120,000 = 0.333
- Weight of Google: $30,000 / $120,000 = 0.25
Portfolio Beta = [Weight of Apple X Beta of Apple] + [Weight of Google X Beta of Google]

\[ \Rightarrow [0.333 \times 1.22] + [0.25 \times 1.13] \]

\[ \Rightarrow 0.40626 + 0.2825 \]

\[ \Rightarrow 0.68876 \]

**Example of Beta Calculation – with long and shorts**

Portfolio Value = $120,000
Market Value of Google in Open Positions: $40,000
Beta of Apple 1.22
Market Value of Apple in Open Positions (Short): -$30,000
Beta of Google: 1.13
Weight of Apple: $40,000 / $120,000 = 0.333
Weight of Google: -$30,000 / $120,000 = -0.25

Portfolio Beta = [Weight of Apple X Beta of Apple] + [Weight of Google X Beta of Google]

\[ \Rightarrow [0.333 \times 1.22] + [-0.25 \times 1.13] \]

\[ \Rightarrow 0.40626 - 0.2825 \]

\[ \Rightarrow 0.12376 \]

**What is Alpha?**

Alpha is the excess return that the portfolio generated over what was expected.

**Calculation of Alpha**

It has two parts to its calculation:

1. The Actual Return of all stocks in the open position
2. The return expected of the stocks in the open position

The EXPECTED return of the Stocks in the Open Positions is calculated as:

\[(\text{No. of days since Portfolio Start} / 365 \times \text{Interest Rate Earned on Cash}) + \text{Beta of Portfolio} \times [\text{Benchmark Return} – (\text{No. of days since Portfolio Start} / 365 \times \text{Interest Rate Earned on Cash})]\]
Example of Alpha:

Initial Cash: $100,000
Interest Rate Earned on Cash: 3%
Interest on Cash to date: $175
Loan Interest: $50
Open Position Profit/ Loss:
  Google: $3,000
  Apple: -$2,000
Total Open Position Profit/ Loss: $1,000
Beta of Portfolio: 0.12376
No. of Days since Portfolio Start: 50
Return on Benchmark Index: 2%

Actual Return: \((1,000 + 175 - 50) / 100,000 \Rightarrow 1.125\%\)
Expected Return: \((50/365 \times 3\%) + 0.12376 \times [2\%-(50/365 \times 3\%)] \Rightarrow 0.6\%\)
**Alpha of Portfolio = 1.125\% - 0.6\% = 0.525\%**