Mathematical Trading Strategies Final Assignment

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Overview of Strategy:

The provided strategy combines various components to generate trading signals for a given stock symbol. Here is a breakdown of what is done in the strategy and how the signals are generated:

1. Indicator-Based Signals: The strategy utilizes indicator-based signals to identify potential buy and sell opportunities. It calculates several indicators such as Bollinger Bands, MACD, and RSI.

- Bollinger Bands: The upper and lower Bollinger Bands are calculated based on the closing prices of the stock. Signals are generated when the price crosses above or below the bands.

- MACD: The MACD line and the signal line are calculated based on the closing prices. Signals are generated when the MACD line crosses above or below the signal line.

- RSI: The Relative Strength Index (RSI) is calculated based on the closing prices. Signals are generated when the RSI crosses above or below specific thresholds.

These indicator-based signals help identify potential overbought and oversold conditions, as well as potential trend reversals.

2. Chart Pattern Signals: The strategy incorporates the detection of specific chart patterns to generate signals. It looks for cup and handle patterns, ascending triangle patterns, and descending triangle patterns. The patterns are identified based on the high and low prices over a specified rolling window. Signals are generated when these patterns are detected.

3. Moving Average Signals: Moving averages are calculated to assess the trend of the stock price. The strategy considers short-term, mid-term, and long-term moving averages. Signals are generated when the moving averages cross each other or exhibit specific orderings, indicating potential trend changes.

4. Index Opinion: The strategy incorporates an index opinion by analyzing the price changes of a specified index. It calculates the cumulative returns of the index over a rolling window. Signals are generated based on the direction and magnitude of these returns. This tells the nature of people towards the market at current time.

5. Final Signal Generation: All the individual signals from the above components (indicator-based, chart pattern, moving averages, and index opinion) are combined into a single final signal column. The final signal is calculated as the sum of the individual signals. Positive values indicate a buy signal, negative values indicate a sell signal, and zero indicates no action.

The strategy aims at capturing potential trading opportunities by considering various technical indicators, chart patterns, moving averages, and index opinions. It combines these signals into a single final signal, allowing for a comprehensive assessment of the stock's potential direction.

Limitation

- The strategy does not effectively detect head and shoulder patterns, which are commonly used in technical analysis for identifying trend reversals.

- Due to the complexity and subjective nature of accurately identifying head and shoulder patterns, they are not included in the strategy.

- The omission of head and shoulder patterns may limit the strategy's ability to capture potential trading opportunities signaled by these patterns.

Results:

Company Name	Cumulative Returns	Maximum Drawdown Ratio	Average Maximum Drawdown	Sharpe Ratio (risk free rate=5%)
Google	4.366	0.4432	0.2239	0.48
Reliance	0.311	0.4509	0.3108	0.51
Apple	1.96	0.3852	0.3302	0.18

P.S. This strategy is designed as a basic approach to identify potential buy and sell signals based on a combination of indicators and chart patterns. It considers various technical indicators and patterns to generate signals and aims to provide a relatively safe trading approach.