ASSIGNMENT: 1

Question 1: Technical Indicator Documentation

This section documents the choice of parameters for three different technical indicators, each representing a different analytical basket. The analysis is performed using the ticker **AAPL**.

1. Momentum Indicator: Rate of Change (ROC)

$$\text{ROC} = \frac{(\text{Current Price} - \text{Price } n \text{ periods ago})}{\text{Price } n \text{ periods ago}} \times 100$$

Parameter Chosen: 14 days

Effect of Decreasing the Parameter: The ROC becomes extremely sensitive to short-term price changes when the lookback period is shortened. This leads to noisy signals and frequent false momentum changes brought on by intraday volatility or small news events (e.g., sharp but insignificant ROC spikes).

Effect of Increasing the Parameter: Although it adds lag, extending the lookback period smoothes the ROC. Because momentum reversals are discovered later, early trend opportunities may be lost and signals may be delayed.

Rationale for Final Choice: A lookback period of 14–22 days strikes a balance between stability and responsiveness. The value of 14 days was chosen because it efficiently captures momentum changes without producing too much noise.

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2. Volume Indicator: Accumulation and Distribution Line (A/D Line)

A/D = Previous A/D + Current Period's Money Flow Volume

Money Flow Volume = Money Flow Multiplier x Volume for the Period

$$\text{Money Flow Multiplier} = \frac{[(\text{Close} - \text{Low}) - (\text{High} - \text{Close})]}{(\text{High} - \text{Low})}$$

Daily High, Low, Close, and Volume data were used to calculate the Accumulation and Distribution Line. The Money Flow Multiplier is undefined in the unique scenario where the High and Low prices are equal. To prevent division errors and guarantee numerical stability, these values were substituted with zero.

This indicator helps identify whether volume is flowing into the asset (accumulation) or out of the asset (distribution).

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3. Volatility Indicator: Volatility Index (VIX)

Parameter Chosen: 365 days

Effect of Decreasing the Time Window: The volatility measure becomes extremely noisy and reactive when the time window is shortened. The indicator may be dominated by short-term spikes, which could result in erratic volatility estimates that might not accurately reflect the state of the market as a whole.

Effect of Increasing the Time Window: A very large window results in lag during times of abrupt market stress because it excessively smoothes volatility and makes the indicator react slowly to shifting market regimes.

Rationale for Final Choice: While avoiding being overly sensitive to short-term swings, a time window of roughly a year captures long-term market volatility trends. This offers a reliable benchmark for evaluating market risk.

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