1. Interest Rate Calculations:

- **Task:** Write a Python function to calculate the future value of an investment given an interest rate.
- **Exercise:** Calculate the future value of $1000 invested for 3, 5, and 10 years at different interest rates (e.g., 3%, 5%, 7%).

2. Forward Contract Pricing:

- **Task:** Create a Python function to calculate the price of a forward contract.
- **Exercise:** Calculate the forward price for different time periods (e.g., 1 year, 2 years) with varying spot prices and interest rates.

3. Basic Option Position:

- **Task:** Construct a long call option position and calculate the payoff at expiration.
- **Exercise:** Calculate the payoff for different strike prices and spot prices, and compare the results for both long and short positions.

4. Construct and Plot a Butterfly Spread

Objective:

- Construct a butterfly spread using call options.
- Plot the payoff of the strategy at expiration to visualize the risk-reward profile.

Instructions:

1. Write a Python function to calculate the payoff for a call option.
2. Construct the butterfly spread using:
    - Buying one call option with a lower strike price.
    - Selling two call options at a middle strike price.
    - Buying one call option at a higher strike price.
3. Plot the total payoff for the strategy.

Exercise:

- Modify the strike prices or premiums and observe how it affects the shape of the payoff diagram.
- Try constructing other strategies like a **bull spread**, **bear spread**, or **straddle**, and plot their payoff diagrams.

5. Task: Retrieve and Analyze Stock Data

Objective:

- Write Python code to retrieve stock price data (e.g., from an API like Yahoo Finance).
- Perform basic data analysis like calculating moving averages or plotting historical prices.

Instructions:

1. Use the yfinance library to download historical stock data.
2. Analyze the stock data by calculating:
    - Simple Moving Averages (SMA).
    - Percentage returns.
    - Volatility (standard deviation)
    - Plot the historical prices along with the moving averages.

Exercise:

1. Retrieve stock data for different companies and compare their performance.
2. Calculate additional metrics such as:
    - Exponential Moving Average (EMA).
    - Daily percentage returns.
    - Volatility (using standard deviation of returns).
3. Modify the time window for moving averages (e.g., 20-day, 100-day) and observe how they differ.