1 Delta_Visualization.py — Price Sensitivity

Purpose

Plots how **Delta** changes with stock price for calls and puts, across different volatilities.

Learning focus

- Delta measures the rate of change of the option price with respect to the underlying.
- Call Delta ranges from 0 to 1, put Delta from -1 to 0.
- Higher volatility makes the Delta curve smoother around the strike — less "binary" behaviour.

Key intuition

Delta is like a hedge ratio — it tells you how many shares are needed to replicate the option. As volatility rises, Delta shifts more gradually.

Experiment

Compare curves for vol = 10% vs vol = 50% to see how low-volatility options have Deltas that jump sharply near strike.

2 Gamma_Visualization.py — Delta's Sensitivity

Purpose

Shows how **Gamma** varies with stock price for different volatilities.

Learning focus

- Gamma measures the rate of change of Delta with respect to the underlying price.
- It peaks for at-the-money options and declines for deep ITM/OTM options.
- Higher volatility flattens and spreads the Gamma peak.

Key intuition

High Gamma means Delta changes quickly, making hedging more demanding. This is most pronounced near expiry and when the option is near the strike.

Experiment

Reduce volatility to see Gamma peak sharply around strike — a sign of higher hedging intensity.

3 Vega_Visualization.py — Volatility Sensitivity

Purpose

Plots Vega versus stock price for different volatilities and maturities.

Learning focus

- Vega measures the sensitivity of the option price to changes in implied volatility.
- Vega is highest for ATM options and increases with time to expiry.
- Longer-dated options have larger Vega because volatility has more time to act.

Key intuition

Vega exposure is a key consideration for volatility traders. Selling Vega in long-dated ATM options means large exposure to volatility changes.

Experiment

Plot Vega for T = 0.25 vs T = 1.0 to see how maturity amplifies Vega.

4 Theta_Visualization.py — Time Decay

Purpose

Plots Theta versus stock price for calls and puts, across different volatilities.

Learning focus

- Theta measures the change in option price per day as time passes, holding everything else constant.
- For calls, Theta is usually negative (time decay hurts the buyer).
- Higher volatility tends to reduce the magnitude of Theta decay for OTM options.

Key intuition

Theta decay accelerates near expiry, especially for ATM options. Option sellers profit from this decay, but risk other Greeks moving against them.

Experiment

Shorten T to see how Theta magnitude increases near expiry.

5 Rho_Visualization.py — Interest Rate Sensitivity

Purpose

Plots Rho versus stock price for calls and puts, across maturities.

Learning focus

- Rho measures the sensitivity of the option price to a 1% change in interest rates.
- Call Rho is positive, put Rho is negative.
- Rho impact increases with maturity, but is generally smaller than other Greeks for equity options.

Key intuition

Rho becomes important for long-dated options and in interest-rate-sensitive markets (e.g., FX options).

Experiment

Compare Rho for T = 3 months vs T = 2 years to see how rate sensitivity grows with time.