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Vega

• Vega_2D.py:

 Plots Vega against stock price for one volatility level, then compares multiple vol levels.

- Shows that Vega peaks when the option is at-the-money (ATM) and drops off for deep ITM or OTM options.
- o Higher volatilities slightly flatten the Vega curve.

• Vega_3D.py:

- Adds time to maturity as a dimension.
- Demonstrates that Vega is higher for longer-dated options and shrinks as expiry approaches.

Trading insight: High Vega means large sensitivity to changes in implied volatility — important for volatility traders and vega hedging.

Delta

• Delta_2D.py:

- o Shows Delta for calls (0 to 1) and puts (-1 to 0), plus how it changes across vol levels.
- o Higher volatility makes the transition around strike more gradual.

• Delta 3D.py:

 Adds time to maturity, showing that short-dated options have a steeper Delta curve near strike, while long-dated ones are smoother.

Trading insight: Delta is your hedge ratio. High Gamma situations require frequent hedge adjustments as Delta changes rapidly.

Gamma

• Gamma_2D.py:

- o Shows Gamma vs stock price for different vol levels.
- Gamma peaks when ATM and falls away on both sides. Lower vol leads to a sharper peak.

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• Gamma 3D.py:

o Adds time to maturity — Gamma peaks are highest for short-dated ATM options.

Trading insight: High Gamma means Delta changes quickly — important for hedgers to anticipate.

Rho

Rho 3D.py:

- Shows Rho for calls (positive) and puts (negative) as functions of stock price and maturity.
- o Interest rate sensitivity grows with time to maturity.

Trading insight: Often minor for equity options, but critical for FX and long-dated structures.

Theta

• Theta 2D.py:

- o Plots time decay for calls and puts.
- Theta is usually negative for long option holders, peaking in magnitude for ATM short-dated options.
- o Shows how volatility affects the decay rate.

Trading insight: Option sellers thrive on Theta decay but face Gamma and Vega risk.

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