Lab Report-5: Pricing an American Put Option

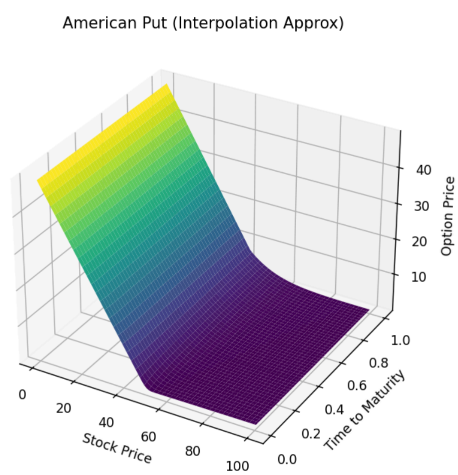
R.Hardhika

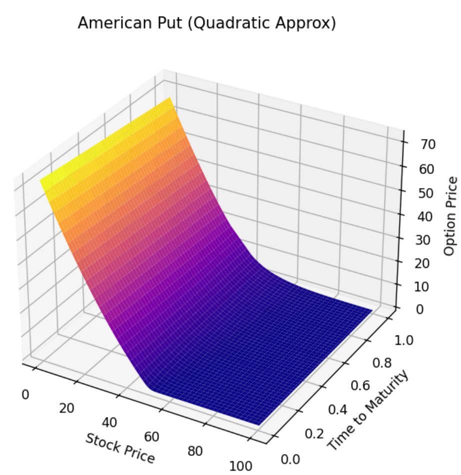
220123052

In this lab, we investigate methods to price an **American put option** with the following parameters:

- Initial stock price: S0=50
- Strike price: K=50
- Time to maturity: T=1
- Risk-free rate: r=0.08
- Volatility: σ=0.30

Results





Option values were computed over a grid of stock prices ($1 \le S \le 100$) and times ($0 < t \le T$). Surfaces of option price against time and stock price were plotted.

- **Interpolation Approximation:**
  - Produces smooth option values.
  - Captures the early exercise feature reasonably well.
  - Accuracy decreases for deep in-the-money options.
- **Quadratic Approximation:**
  - Provides a closer fit near the early exercise boundary.
  - Produces higher option values than interpolation in deep in-the-money regions.

- The **interpolation method** is computationally efficient but less precise for extreme values of SS.
- The **quadratic method** captures early exercise effects better but may overestimate in certain cases.

Conclusion

Both approaches produce option values close to those from the cryers algorithm, with quadratic performing slightly better near the early exercise boundary. These approximations are useful when fast computations are required, while finite difference methods remain the most accurate method.