Finance 4335 "Teaching the Economics and Convergence of the Binomial and Black-Scholes Option Pricing Formulas"
Outline and Study Questions

Here is a summary of the key points from the *Teaching the Economics and Convergence of the Binomial and Black-Scholes Option Pricing Formulas* reading, along with Study Questions and Answers:

Summary

- Introduction
  - Aim is to simplify option pricing for undergraduate students
  - Use a case study of a student comparing job offers (one with options)
  - Show how no-arbitrage links binomial and Black-Scholes models
  - Illustrate analytical and numerical convergence
- Single-Period Models
  - Delta hedging
  - Replicating portfolio
  - Risk-neutral valuation
    - All rely on no-arbitrage principle
  - Show risk-neutral relationship between option and underlying asset
- Multi-Period Model
  - Extend risk-neutral valuation using backward induction
  - Generalizes to Cox-Ross-Rubinstein (CRR) binomial formula
- Convergence
  - Analytically and numerically
    - CRR probabilities and prices converge to Black-Scholes probabilities and price as the number of timesteps → ∞
  - Spreadsheet model
    - Illustrates numerical convergence
  - CRR terminal returns → normal distribution (central limit theorem)
- Conclusion
  - Demystify option pricing theory and convergence for students

- Connect Delta hedging, Replicating portfolio, and Risk-neutral valuation approaches via no-arbitrage principle

Study Questions and Answers

Question	Answer
What are the three main approaches to option pricing discussed?	Delta hedging, replicating portfolio, risk-neutral valuation
How does the risk-neutral valuation relationship arise?	All approaches rely on no-arbitrage principle
How is the single-period model extended?	Using backward induction to a multi-period, CRR binomial model
What converges between CRR and Black-Scholes?	Probabilities, option prices
How is convergence shown?	Both analytically and numerically
What is the main takeaway?	Different approaches linked by no-arbitrage, converge to Black-Scholes