

The Cox-Ross-Rubinstein

Formula

# The Binomial Market

Question

"Arbitrage"

# Answer (pt 1)

## Theorem: the Law of One Price

Given two self-financing portfolios  $P_1, P_2$  with payoffs  $V_1, V_2$  and current prices  $C_1, C_2$ , if  $P(V_1 \geq V_2) = 1$ , we must have

$C_1 \geq C_2$  to avoid arbitrage.



if  $T = 1 \dots$







Risk - neutral measure





Board-cleaning break



Call options









# Example

$$T=3, \quad u=1.2, \quad d=0.8, \quad r=0.1, \quad S=100$$

$$K=110$$

$$S_3 \in \{51.2, 76.8, 115.2, 172.8\}$$





# Theorem: the Law of One Price

Given two self-financing portfolios  $P_1, P_2$  with payoffs  $V_1, V_2$  and current prices  $C_1, C_2$ ,

if  $\mathbb{P}(V_1 \geq V_2) = 1$ , we must have

$C_1 \geq C_2$  to avoid arbitrage.