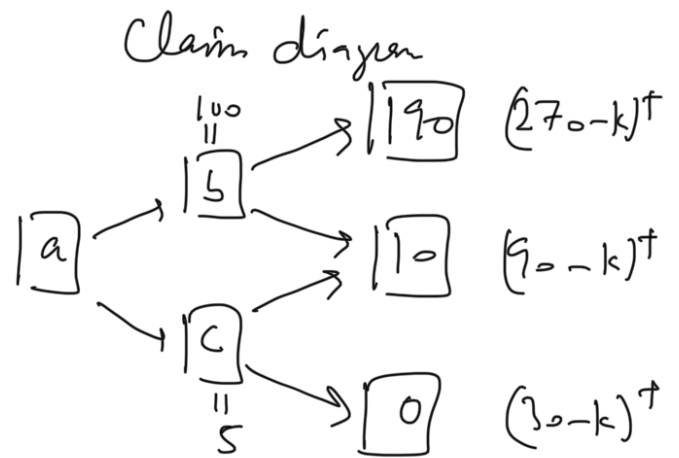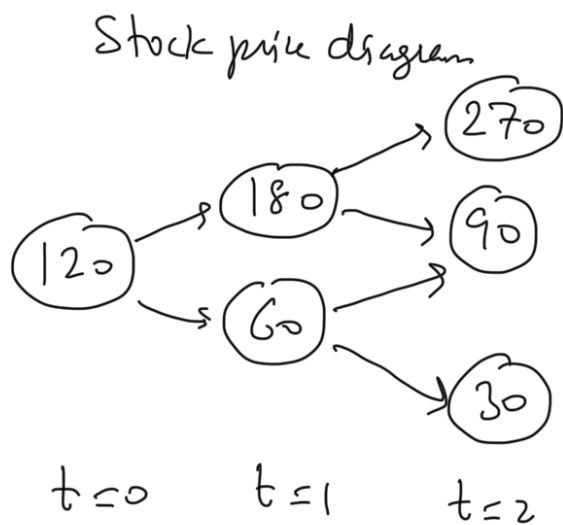## Multi-period Binomial market:

Example Price and replicate a call with strike
$k = 80$ on the stock in a two-period binomial
market with $u = 1.5$, $d = 0.5$, $r = 0$ and $S_0 = 120$

Sol $d < 1+r < u$ NA market

Stock price diagram

Claim diagram

$$p^* = \frac{1+r-d}{u-d} = 0.5 \quad , 1-p^* = 0.5$$

For node b

$$\Delta_2[180] = \frac{190-10}{270-90} = 1 \quad , b_2[180] = \frac{1.5 \times 10 - 0.5 \times 190}{1^2(1.5-0.5)}$$

$$= -80$$

For node C

$$\Delta_2[60] = \frac{10-0}{90-30} = \frac{1}{6} \quad , b_2[60] = \frac{1.5 \times 0 - 0.5 \times 10}{1^2(1.5-0.5)}$$

$$= -5$$

For t=1   claim value

$V_1[180] = \Delta_2[180] \times 180 + b_2[180] \times (1+r) = |1 \times 180 - 80 \times 1| = 100$

$(= b)$

$V_1[60] = \Delta_2[60] \times 60 + b_2[60] \times (1+r) = \frac{1}{6} \times 60 - 5 = 5$

$(= c)$

$b, \quad c$
$\cup \quad ||$
$100, 5$ are   the   amt   of   money   one   needs

at that time   in   those two different states of

the world , to achieve perfect replicate of the

Cell at time $t = 2$

$\Delta_1[120] = \dfrac{100 - 5}{180 - 60} = \dfrac{19}{24}$, $b_1[120] = \dfrac{1.5 \times 5 - 0.5 \times 100}{1 \times (1.5 - 0.5)}$

$= -42.5$

$\therefore \ t = 0$ claim value

$V_0[120] = \Delta_1[120] \times 120 + b_1[120]$

$= \dfrac{19}{24} \times 120 - 42.5 = 52.5$