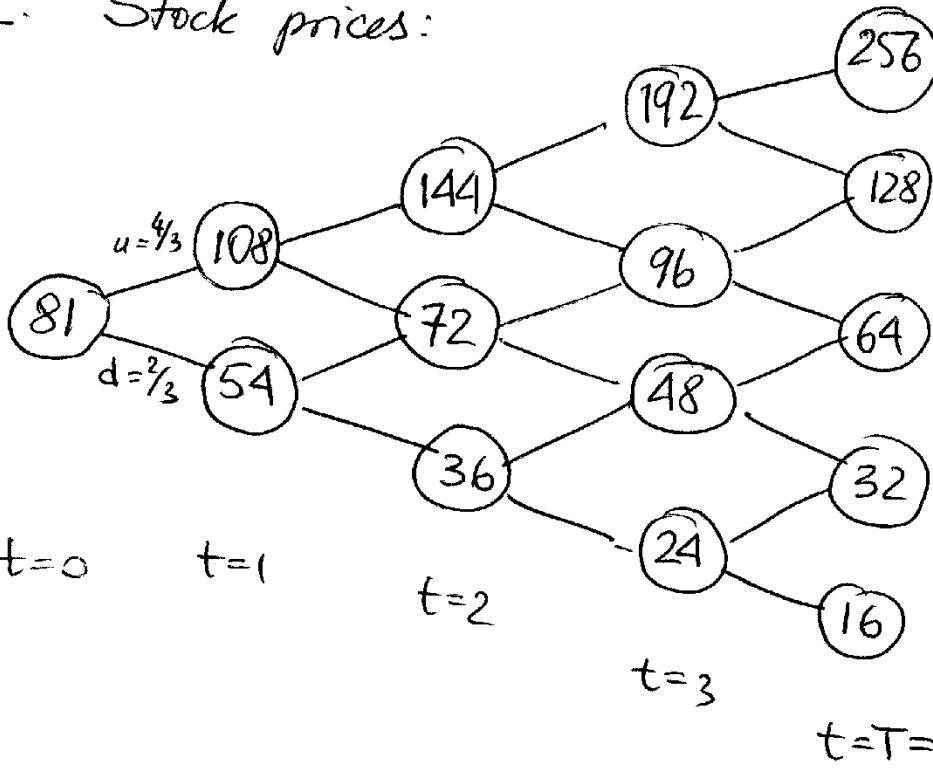


Solutions to HW-2 problems

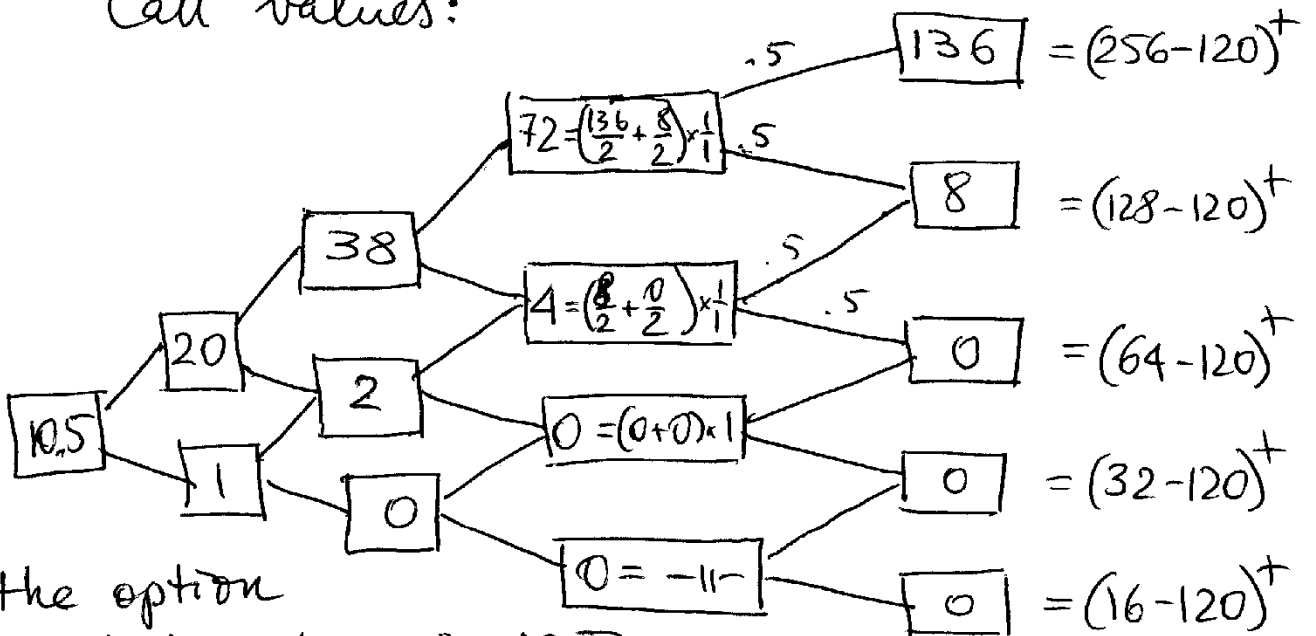
1. Stock prices:



$$p^* = \frac{1+r-d}{u-d} = \frac{1-2/3}{4/3-2/3} = 0.5; \quad 1-p^* = 0.5;$$

call payoff: $X = (S_4 - 120)^+$

Call values:



So the option price at time $t=0$ is 10.5.

2. (a) Black-Scholes formula (slide 79):

2
HW-2

$$C = S_0 N(h) - Ke^{-rT} N(h - \sigma\sqrt{T})$$

$$\approx 18.50 \times N(0.11836) - 18.5 \times e^{-0.062 \times 1/12} N(0.06062) \approx \underline{\underline{0.4743}}$$

$$\text{since } h = \frac{\ln(S_0/K) + (r + \sigma^2/2)T}{\sigma\sqrt{T}} = \frac{\ln(18.5/18.5) + (0.062 + \frac{0.2^2}{2}) \times \frac{1}{12}}{0.2 \times \sqrt{1/12}}$$

$$\approx 0.11836.$$

(b) The implied volatility $\approx \underline{\underline{0.2594}}$