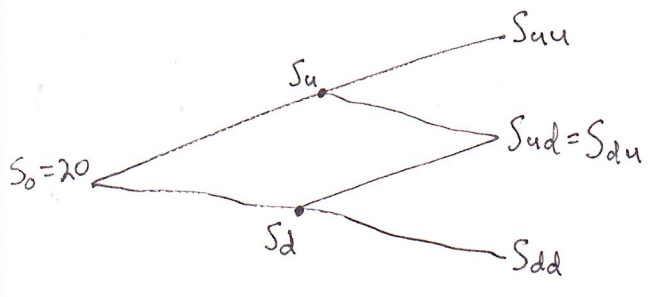


(4)

$S_0 = 20$ $\delta = 0$ $r = 5\%$ $K = 22$ $u = 1.2840$ $d = .8607$



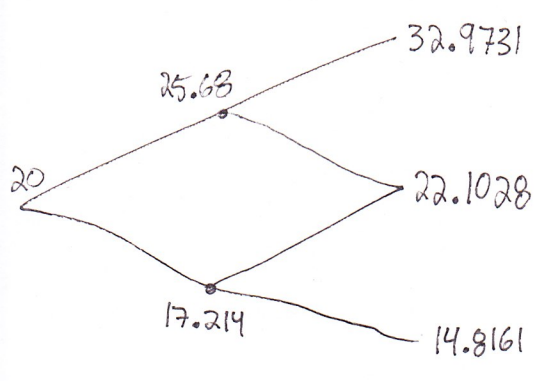
$S_u = S_0 \cdot u = 20 \cdot 1.2840 = 25.680$

$S_d = S_0 \cdot d = 20 \cdot .8607 = 17.214$

$S_{ud} = S_0 \cdot u \cdot d = 20 \cdot 1.2840 \cdot .8607 = 22.1028$

$S_{uu} = S_0 \cdot u^2 = 20 \cdot 1.2840^2 = 32.9731$

$S_{dd} = S_0 \cdot d^2 = 20 \cdot .8607^2 = 14.8161$



$C_{uu} = 32.9731 - 22 = 10.9731$

$C_{ud} = 22.1028 - 22 = .1028$

$C_{dd} = \emptyset$

(4)

$$p^* = \frac{e^{(r-s)h} - d}{u - d} = \frac{e^{.05} - .8607}{1.284 - .8607} = .4502$$

$$\begin{aligned} C_u &= e^{-rh} [p^* \cdot C_{uu} + (1-p^*) C_{ud}] \\ &= e^{-.05} [.4502 \cdot 10.9731 + (.5498) \cdot 1028] \\ &= 4.7530 \end{aligned}$$

$$\begin{aligned} C_d &= e^{-rh} [p^* \cdot C_{ud} + (1-p^*) C_{dd}] \\ &= e^{-.05} [.4502 \cdot 1028] \\ &= .0440 \end{aligned}$$

Compare values to option of exercising call at time 1

$$C_u = 4.7530 > (25.68 - 22) \Rightarrow \text{No early exercise.}$$

$$C_d = .0440 > 0 \Rightarrow \text{No early exercise.}$$

$$\begin{aligned} C_0 &= e^{-rh} [p^* \cdot C_u + (1-p^*) \cdot C_d] \\ &= e^{-.05} [.4502 \cdot 4.753 + (.5498) \cdot .0440] \\ &= 2.0585 \quad \textcircled{C} \end{aligned}$$