1)

(a) $1000 \times 0.6 + (-1500) \times 0.4$

$= 0$

(b) Yes

(c) Not necessarily. the assessment of p is subjective.

(d) Yes

(e) The statistician's assessment of p is crucial.

2

(a) long R^* and short R

(b) No

(c) No role

13) $E(S_{10})$

(1) $= 100 + 10 \times \left(10 \times \frac{1}{3} - 10 \times \frac{2}{3}\right)$

$\doteq 66.7$

$P(S_{10} \geq 100)$

$= \sum_{k=5}^{10} \binom{10}{k} \left(\frac{1}{3}\right)^k \left(\frac{2}{3}\right)^{10-k}$

$= \underline{\underline{0.21}}$

15

1) Long $C(K1)$ and short $C(K2)$

$\Rightarrow$ payoff is non-negative

$\therefore C(K1) > C(K2)$

2) Short $C(K1)$, long $C(K2)$ and issue a bond.

3) Similar to 2).

⑩

$S=20,\ K=22,\ r=0.05,\ u=1.284,\ d=0.8607$

$$p=\frac{e^{0.05}-d}{u-d}=0.45$$

$$\begin{array}{ccccc} & & & & 32.97 \\ & & 25.68 & < & \\ 20 & < & & & 20 \\ & & 17.21 & < & \\ & & & & 14.81 \end{array}$$

If exercise at $t=1 \rightarrow V = 3.68\,p\,e^{-r} = 1.58$

If exercise at $t=2 \rightarrow V = 4.7\,p\,e^{-r} = 2.01$

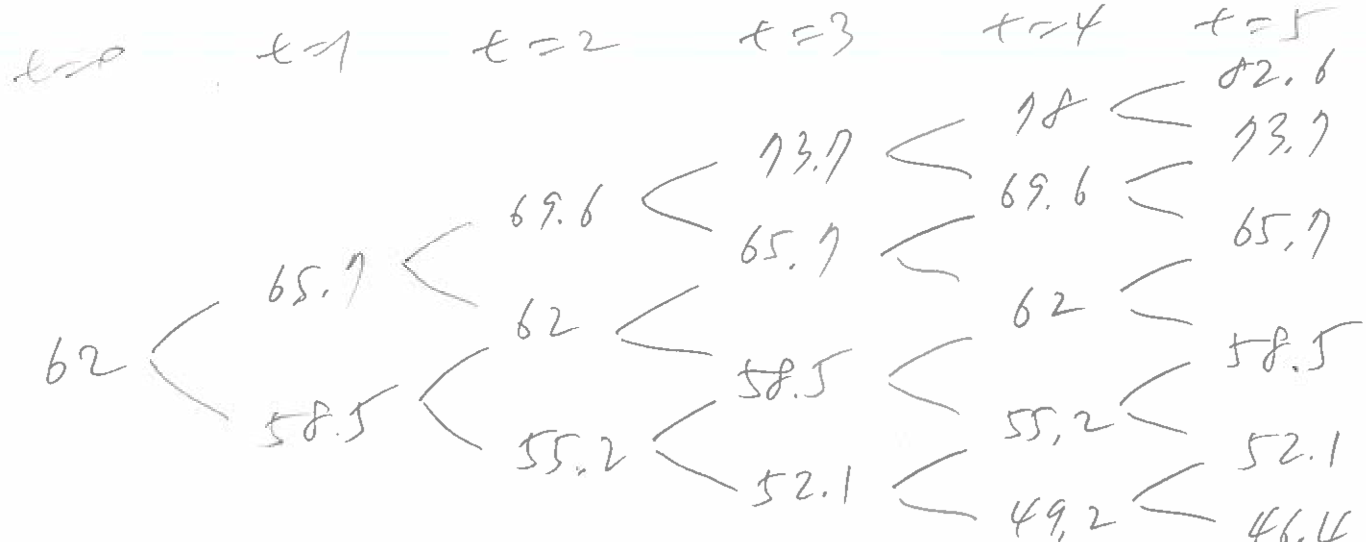
$$\begin{array}{ccccc} & & & & 10.97 \\ & & 4.7 & < & \\ & < & & & 0 \\ & & 0 & < & \\ & & & & 0 \end{array}$$

$\therefore V = \max(1.58,\ 2.01) = \underline{\underline{2.01}}$

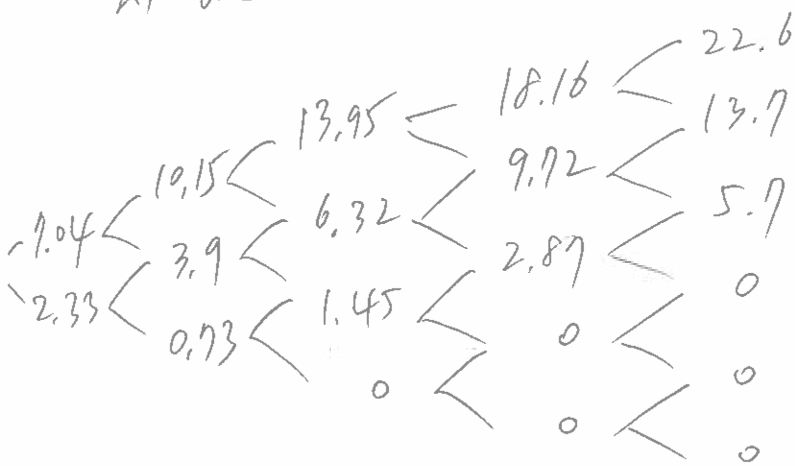
(11) $S_0 = 62$, $\sigma = 0.2$, $r = 2.5\%$, $K = 60$

$$u = e^{\sigma\sqrt{\frac{1}{12}}} = 1.059, \quad d = 0.944$$

$$p = \frac{e^{0.025 \cdot \frac{1}{12}} - d}{u - d} = 0.505$$

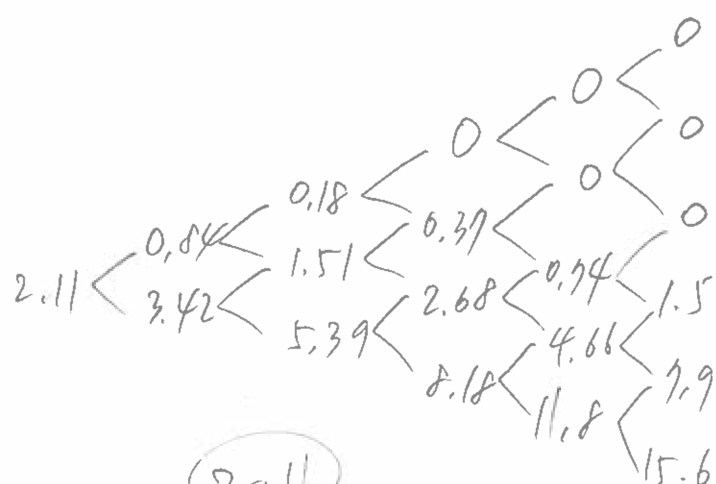


If we choose this to be call,



(4.7)

If we choose this to be put



(2.11)

$$\therefore V = \max(4.7, 2.11) = \underline{\underline{4.7}}$$

12

$$\begin{tikzcd} & 53 \\ 50 \arrow[ur, "p"] \arrow[dr, "1-p"'] & \\ & 48 \end{tikzcd}$$

Let p be a risk-neutral probability

$$50e^{0.1/6} = 53p + 48(1-p) \Rightarrow p = 0.57$$

$$\therefore c = 4pe^{-0.1/6} = \underline{\underline{2.24}}$$

13

$$\begin{tikzcd} & 27 \\ 25 \arrow[ur, "p"] \arrow[dr, "1-p"'] & \\ & 23 \end{tikzcd}$$

$$25e^{0.1/6} = 27p + 23(1-p) \Rightarrow p = 0.605$$

$$V = e^{-0.1/6}\left[27^2 p + 23^2(1-p)\right]$$

$$= \underline{\underline{639}}$$