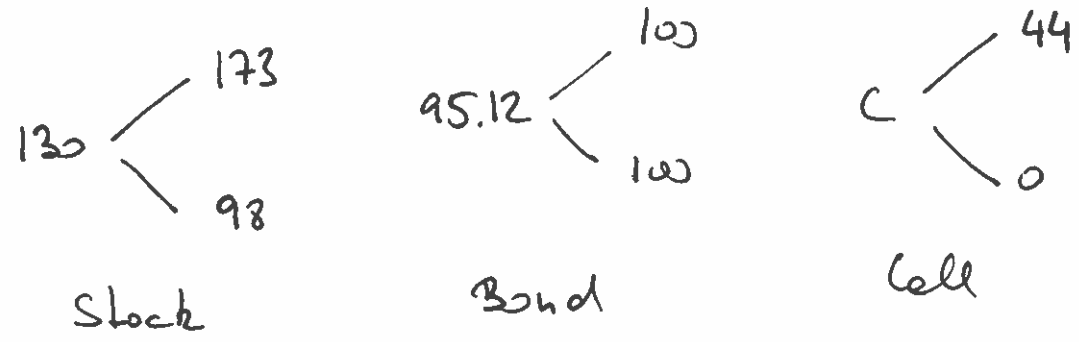
Problem Set 4

Problem 1



We solve

$$173\,N_S + 100\,N_B = 44$$
$$98\,N_S + 100\,N_B = 0$$

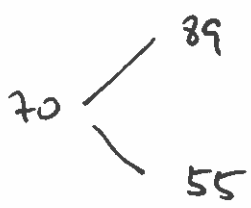
$$N_S = \frac{44-0}{173-98} = 0.5867$$

$$N_B = -\frac{98}{100}\,N_S = -0.5749$$

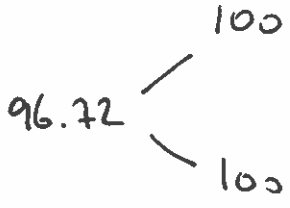
$$\text{Call} = 0.5867 \times 130 - 0.5749 \times 95.12$$
$$= 21.58$$

Note: The face value of the bond is arbitrary and does not affect the delta (number of shares) or the price of the option.

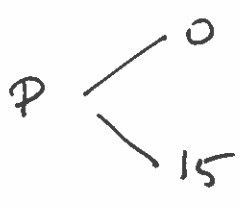
Problem 2



Stock



Bond



Put

We solve

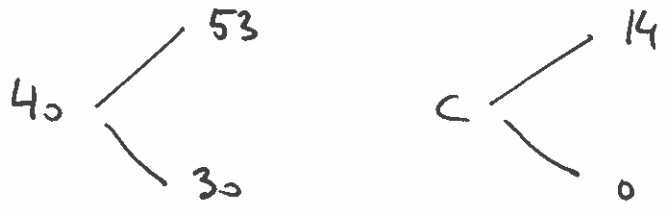
$$89\,N_S + 100\,N_B = 0$$
$$55\,N_S + 100\,N_B = 15$$

$$N_S = \frac{0 - 15}{89 - 55} = -0.4412$$

$$N_B = -\frac{89}{100} N_S = 0.3926$$

$$\text{Put} = -0.4412 \times 70 + 0.3926 \times 96.72$$
$$= 7.10$$

Problem 3

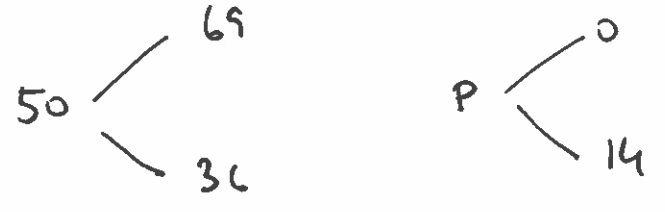


Stock Call

$$q = \frac{40\, e^{0.08 \times 4/12} - 30}{53 - 30} = 0.4818$$

$$\text{Call} = (14q + 0(1-q))\, e^{-0.08 \times 4/12} = 6.57$$

Problem 4

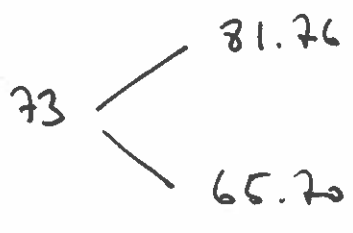


Stock Put

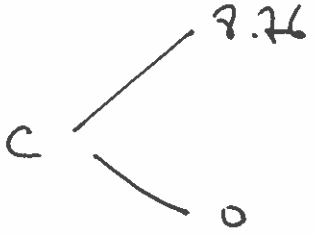
$$q = \frac{50\, e^{0.10 \times 6/12} - 36}{69 - 36} = 0.5019$$

$$\text{Put} = (0q + 14(1-q))\, e^{-0.10 \times 6/12} = 6.63$$

Problem 5



Stock

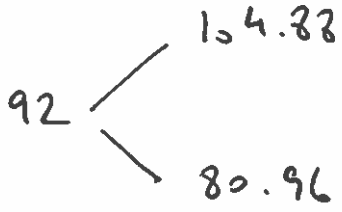


Call

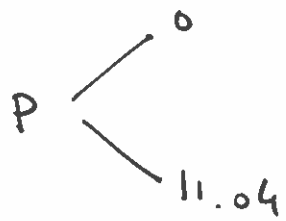
$$N_S = \frac{8.76 - 0}{81.76 - 65.70} \times 100 = 54.55 \simeq 55 \text{ shares.}$$

She needs to buy 55 shares.

Problem 6



Stock



Put

$$N_S = \frac{0 - 11.04}{104.88 - 80.96} \times 100 = -46.15 \simeq -46 \text{ shares}$$

She needs to sell 46 shares.