21-S1-Q2

(a)

(i) $\propto P$

(ii) NBE

(b) BP

Solution (a)(i)

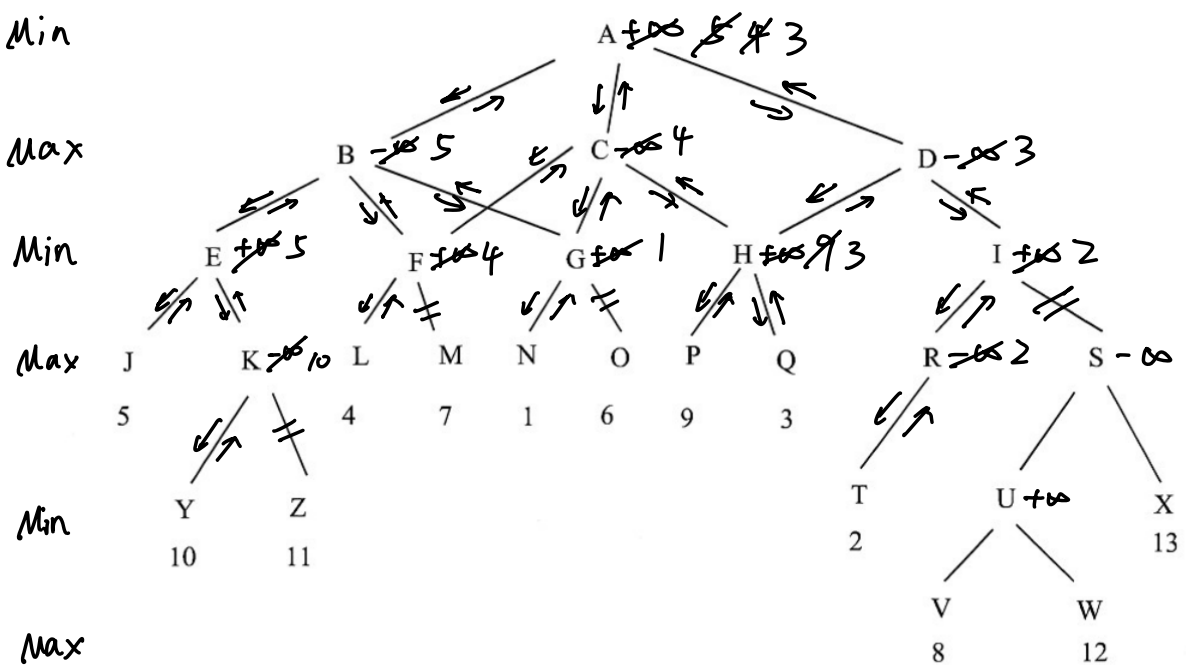

Figure 2. The game tree

(ii) Z, M, O, S, V, X, V, W

(b) (i) ① O_2

$net_2 = 0.8 \times 1 + 0.3 \times 1 = 1.1$

$O_2 = \sigma(net_2) = 1.1$

② O_3

$net_3 = 0.1 \times 1 + 0.6 \times 1 = 0.7$

$O_3 = \sigma(net_3) = 0.7$

③ O_4

$net_4 = 1 \times 1 + 0.9 \times 1.1 + 0.3 \times 0.7 + 0.2 \times 1$

$= 2.4$

$O_4 = \sigma(net_4) = 2.4$

④ O_5

$net_5 = 0.5 \times 1.1 + 0.2 \times 0.7 - 0.9 \times 1$

$= -0.21$

$O_5 = \sigma(net_5) = 0.1 \times (-0.21) = -0.021$

(ii) ① $\delta_K = \sigma'(net_K)(t_K - O_K)$

② $\delta_j = \sigma'(net_j) \sum_K \delta_K w_{Kj}$

(iii) $\delta_4 = \delta'(net_4)(t_4 - O_4)$

$= 1 \times (0.2 - 2.4)$

$= -2.2$

$\delta_5 = \delta'(net_5)(t_5 - O_5)$

$= 0.1 \times (0.8 - (-0.021))$

$= 0.0821$

$$\delta_2 = \sigma'(net_2)(\delta_4 w_{42} + \delta_5 w_{52})$$

$$= 1 \times (-2.2 \times 0.9 + 0.0821 \times 0.5)$$

$$= -1.93895$$

$$\delta_3 = \sigma'(net_3)(\delta_4 w_{43} + \delta_5 w_{53})$$

$$= 1 \times (-2.2 \times 0.3 + 0.0821 \times 0.2)$$

$$= -0.64358$$

(iv) ① $\Delta w_{ji} = \eta \delta_j o_i$

$$\Delta w_{21} = \eta \delta_2 o_1$$

$$= 0.5 \times (-1.93895) \times 1$$

$$= -0.969475$$

② $\Delta w_{4b} = \eta \delta_4 o_b$

$$= 0.5 \times (-2.2) \times 1$$

$$= -1.1$$