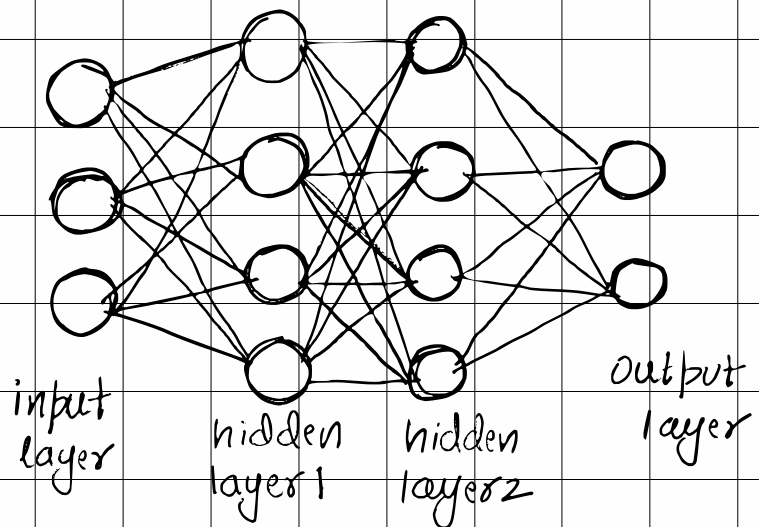
Ans 3)



Ans 4)

i) Shape of $w^{(0)}$ w/o bias = (4,3)
4 rows 3 columns

ii) Shape of $w^{(0)}$ with bias = (4,3)
4 rows 3 columns

iii) Shape of $w^{(1)}$ w/o bias = (4,4)
4 rows 4 columns

iv) Shape of $w^{(2)}$ w/o bias = (4,2)
4 rows, 2 columns

Q5) $x = [1, 1]$, $w = [1, 1]$

i) considering $b = 0$

$y' = xw^T + b$

$= [1, 1] \begin{bmatrix} 1 \\ 1 \end{bmatrix} + 0$

$= 1 \times 1 + 1 \times 1$

$= 2$

$y = Af(z) = 2$

Af: linear activation function

ii) $x = [-1, -1]$

$y' = [-1, -1] \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

$y' = (-1 \times 1) + (-1 \times 1)$

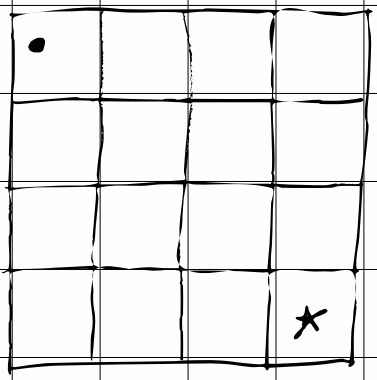
$y' = -2$

$y = Af(-2)$

$y = 0$

Af: Relu

Q6)



i) Size of search space = $4 \times 4 = 16$

ii) possible actions : 8

{ up.
down
left
right
top-left
top-right
bottom-left
bottom-right }

iii) 2 ways:

adjacency list

adjacency matrix

Q7) i) DFS : $1 \rightarrow 2 \rightarrow 5 \rightarrow 4$

$1 \rightarrow 3 \rightarrow 4$

ii) BFS

$1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

iii) uniform cost search.

$1 \rightarrow 2 \rightarrow 5 \rightarrow 6 \rightarrow 4$

Q1) $L(w) = \frac{1}{2}(wx - y)^2$

$$\frac{dL(w)}{dw} = \frac{1}{2}\left((wx)^2 + y^2 - 2wxy\right).$$

$$= \frac{1}{2}(x^2)w^2 - \frac{x^2}{2} \cdot 2w$$

$$= x^2 w - 2xy$$

i) $w_{i+1} = w_0 - \eta \cdot \frac{dL(w)}{dw}$

$$w_1 = -1 - 0.2\,(1 - 1 - 2 \times 1 \times 1)$$

$$= -0.4$$

ii) $w_1 = -1 - 0.1\,(x^2 w - 2xy)$

$$= -1 - 0.1\,(1 \times -1 - 2 \times 1 \times -1)$$

$$= -1.01$$

Q2) i) entrophy (play, temp).

i) $E(p) = -1 \times \sum_{i=1}^{N} p_i (\log(p_i))$

$= 0.9111$

ii) Entrophy (play) = $\underline{1.00}$