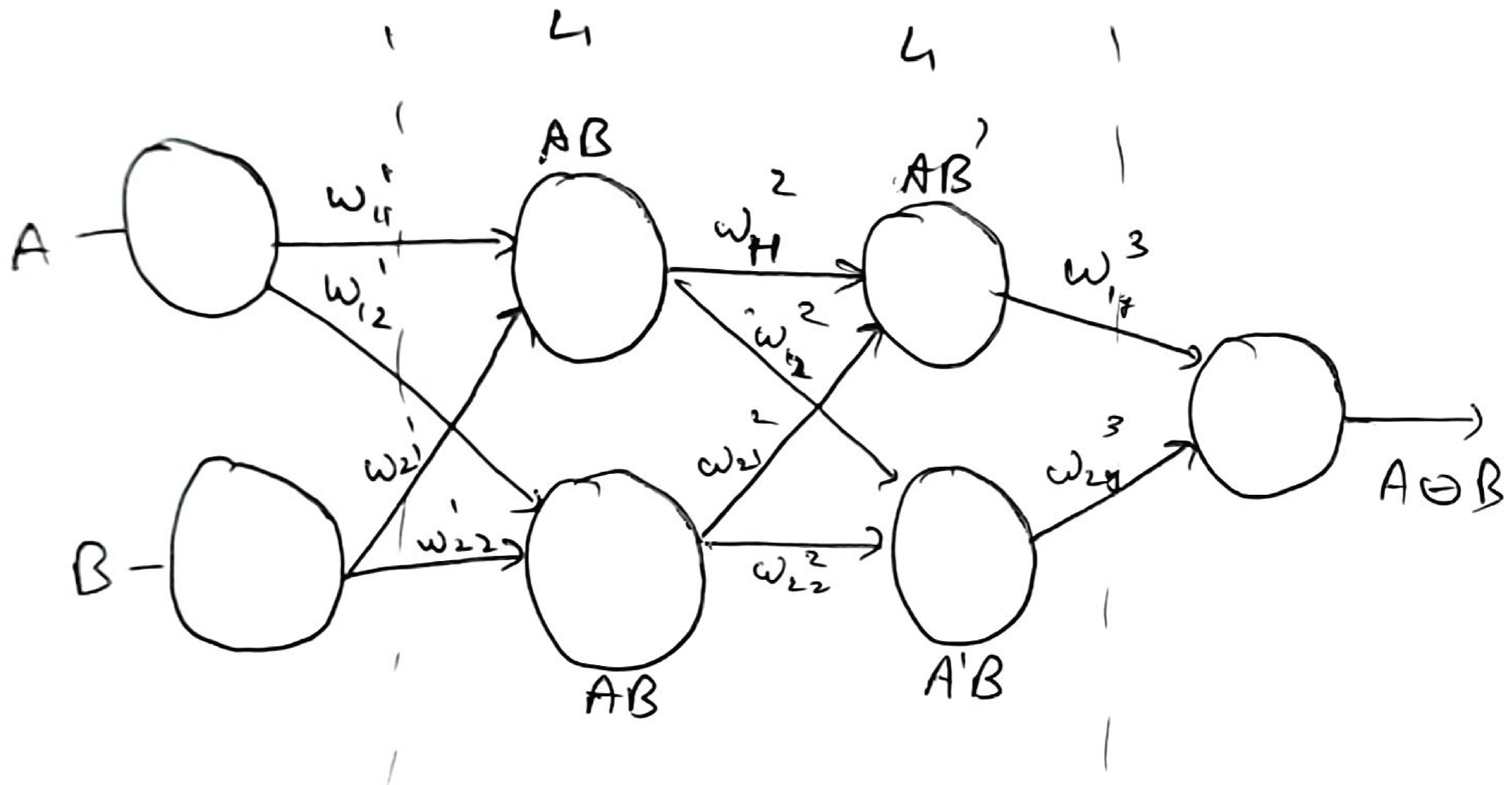


Assignment - 2

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XOR with 2 hidden layers



For L₁:

$$w_{11}'A + w_{21}'B = y$$

A	B	$w_{11}'A + w_{21}'B$	$y(AB)$
0	0	0	0
0	1	w_{21}'	0
1	0	w_{11}'	0
1	1	$w_{11}' + w_{21}'$	1

Let threshold = Θ

$$w_{21}' < \Theta$$

$$w_{11}' < \Theta$$

$$w_{11}' + w_{21}' \geq \Theta$$

where $\Theta = 1$

\therefore we assume $w_{21}' = 0.5$, $w_{11}' = 0.5$

Similarly for the other node

$$w_{12}, w_{21} = 0.3$$

for Output to be $\ominus A \oplus B$,

L_2 such that:

$$A w_{11}^2 + B w_{21}^2 = AB'$$

A	B	$A w_{11}^2 + B w_{21}^2$	$\&(AB')$
0	0	0	0
0	1	0 w_{21}^2	0
1	0	0 w_{11}^2	1
1	1	$w_{11}^2 + w_{21}^2$	0

\therefore let threshold $= \ominus$

$$w_{21}^2 < \ominus$$

$$w_{11}^2 \geq \ominus$$

$$w_{11}^2 + w_{21}^2 < 0$$

\Rightarrow we can assume $w_{21}^2 = -1$

$$w_{11}^2 = 1$$

where $\ominus = 0$.

a similar approach can be taken for the other node.

For L_2 :

$$w_{1y}^3 AB' + w_{2y}^3 A'B = y$$

where $y = A \oplus B$

A	B	$w_{1y}^3 AB' + w_{2y}^3 A'B$	y (A ⊕ B)
0	0	0	0
0	1	w_{2y}^3	1
1	0	w_{1y}^3	1
1	1	$w_{1y}^3 + w_{2y}^3$	0

$$w_{2y}^3 \geq \ominus$$

$$w_{1y}^3 \geq \ominus$$

$$w_{1y}^3 + w_{2y}^3 \leq \ominus$$

for $\ominus = -1$

$$w_{2y}^3 = -0.5$$

$$w_{1y}^3 = -0.5$$

$$w_{1y}^3 + w_{2y}^3 = -1$$

Hence we have XOR with 2 hidden layers