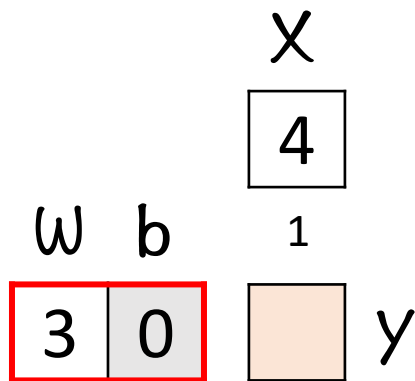
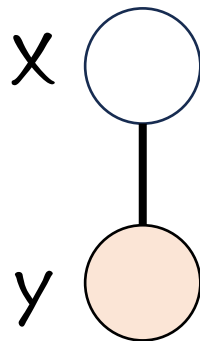


Linear Layer

Exercise 1

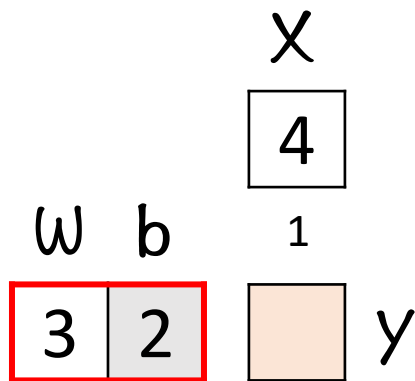


$$y = [w|b] \cdot [X|1] = wX + b$$

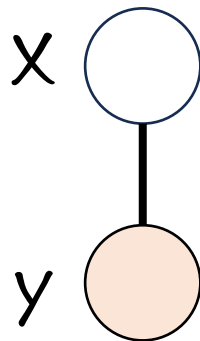


Linear Layer

Exercise 2

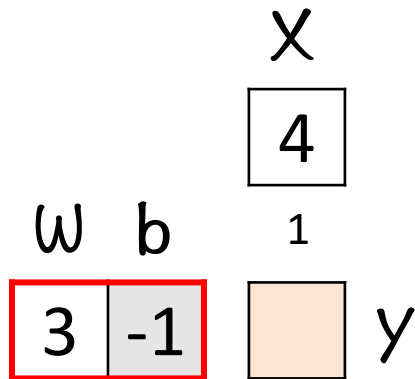


$$y = [w|b] \cdot [X|1] = wX + b$$

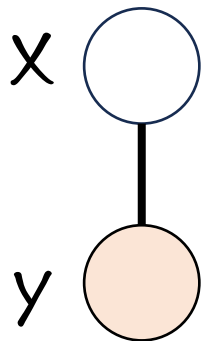


Linear Layer

Exercise 3



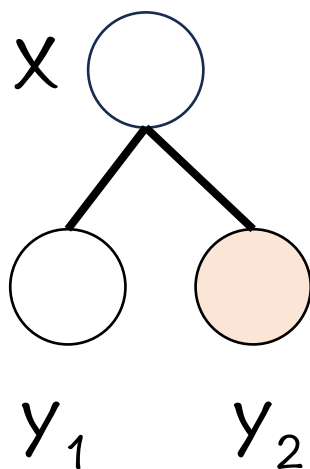
$$y = [w|b] \cdot [x|1] = wx + b$$



Linear Layer

Exercise 4

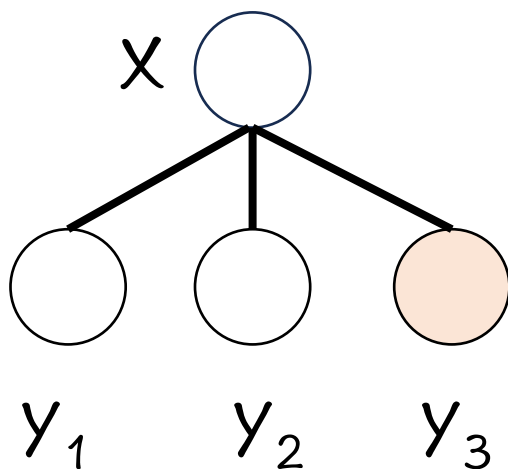
		x	
		4	
w	b	1	
3	2	14	y_1
3	-2		y_2



Linear Layer

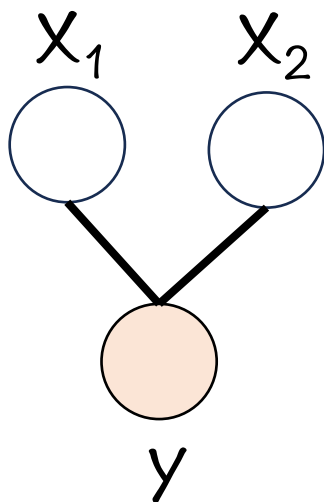
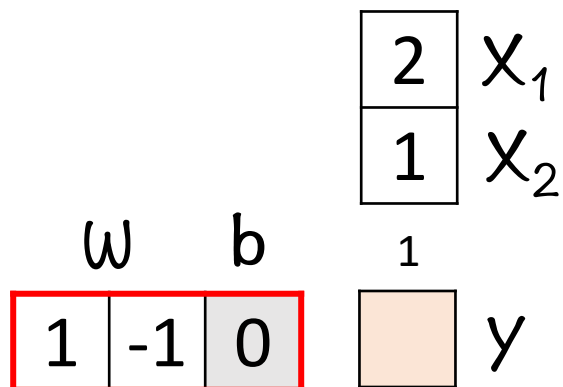
Exercise 5

		X	
		2	
w	b	1	
3	2	8	y_1
3	-2	4	y_2
3	-4		y_3



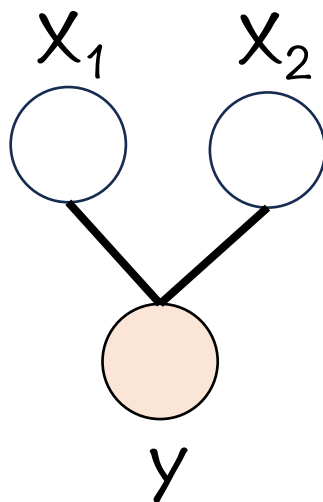
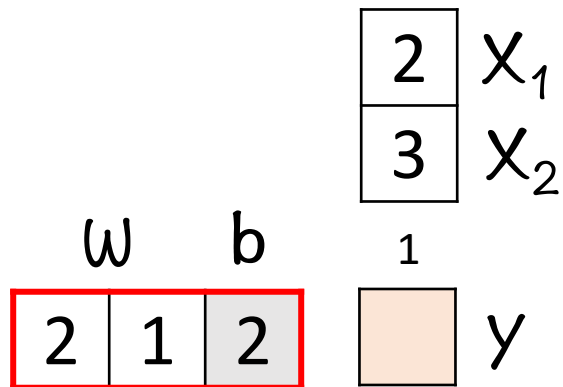
Linear Layer

Exercise 6



Linear Layer

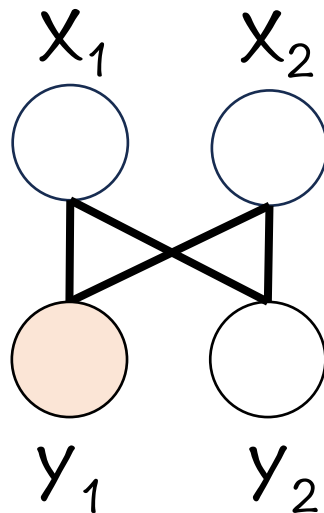
Exercise 7



Linear Layer

Exercise 8

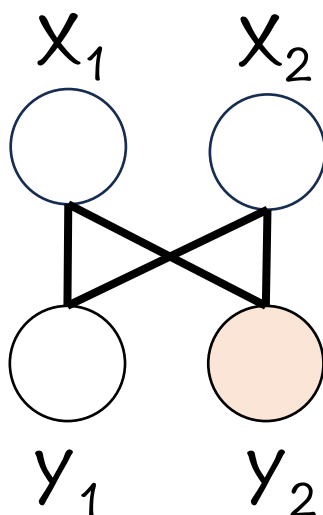
Diagram illustrating the input vector x and weight matrix w for a single neuron. The input vector x is a column vector with elements $x_1 = 2$ and $x_2 = -1$. The weight matrix w is a 2×3 matrix with elements $w_{11} = 1, w_{12} = 1, w_{13} = 0$ and $w_{21} = 1, w_{22} = -1, w_{23} = 0$. The bias b is 1. The output vector y is a column vector with elements y_1 (orange) and $y_2 = 3$.



Linear Layer

Exercise 9

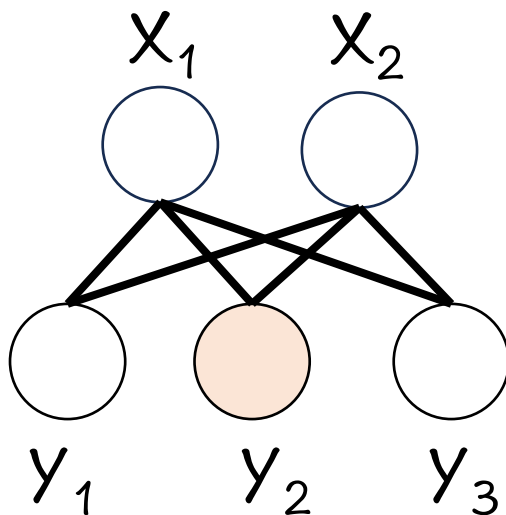
w			b		
1	1	2	1	2	x_1
1	-1	2		1	x_2
				5	y_1
					y_2



Linear Layer

Exercise 10

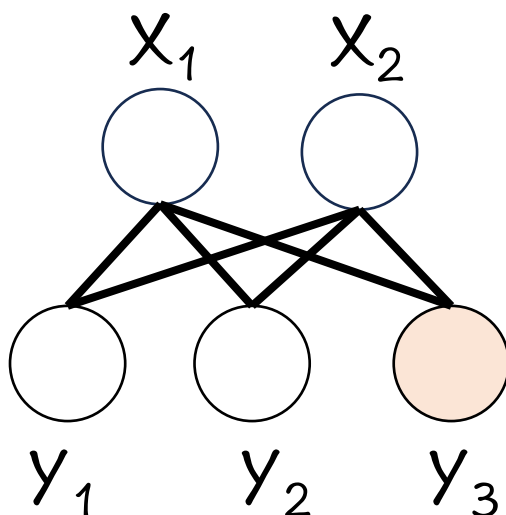
w			b		
1	1	0	3	2	x_1 x_2
0	1	0	1		
1	-1	0	5		y_1 y_2 y_3



Linear Layer

Exercise 11

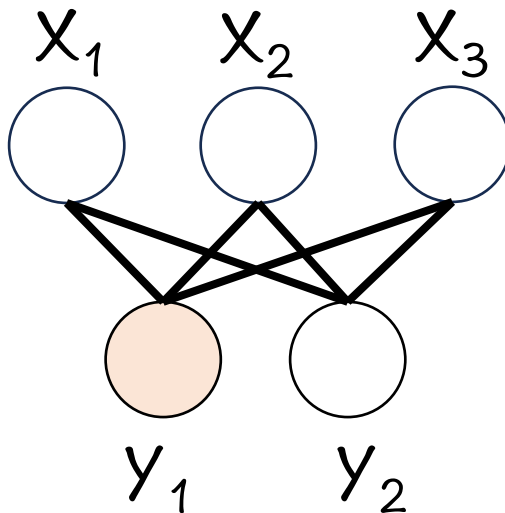
ω			b		
1	1	0	4	x_1	
1	-1	0	7	x_2	
-1	1	0	1		
			11	y_1	
			-3	y_2	
				y_3	



Linear Layer

Exercise 12

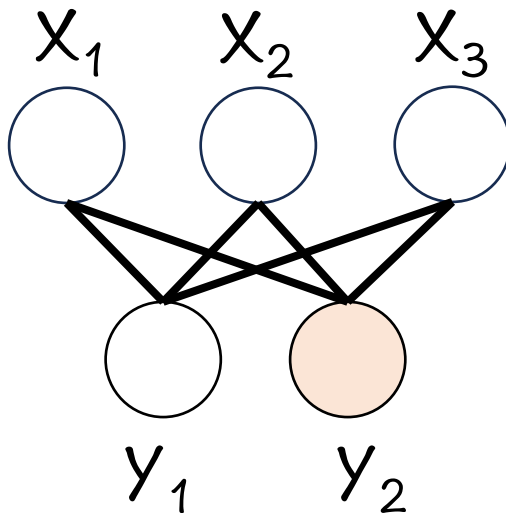
				1	x_1
				-2	x_2
				3	x_3
w		b		1	
1	-1	1	0		y_1
1	1	1	0	2	y_2



Linear Layer

Exercise 13

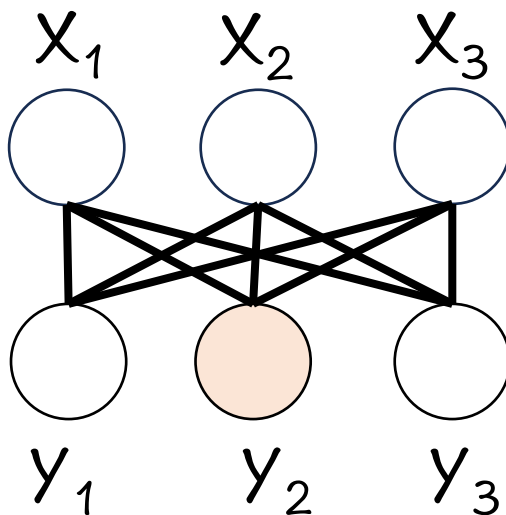
				3	x_1
				1	x_2
				2	x_3
				1	
w				3	y_1
1	1	0	-1		y_2
1	0	1	-1		



Linear Layer

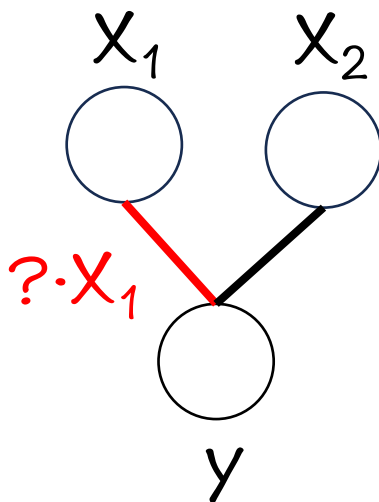
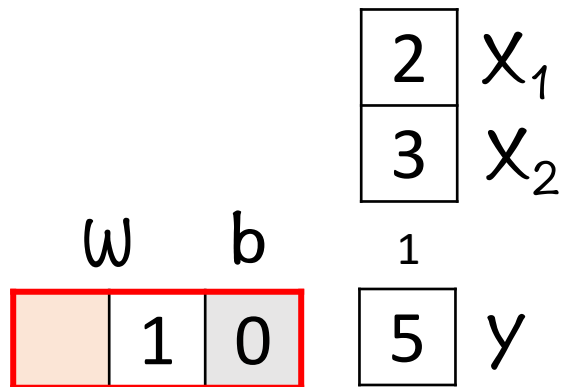
Exercise 14

				3	x_1
				1	x_2
				2	x_3
w		b		1	
1	1	0	0	4	y_1
0	1	1	0		y_2
1	0	1	0	5	y_3



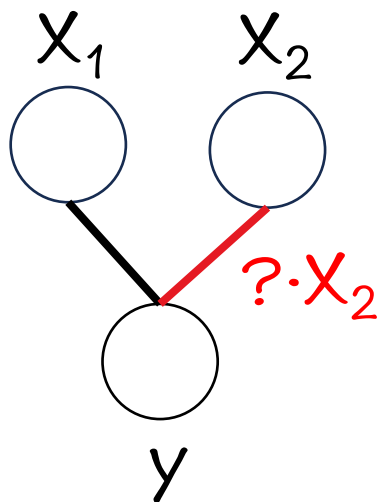
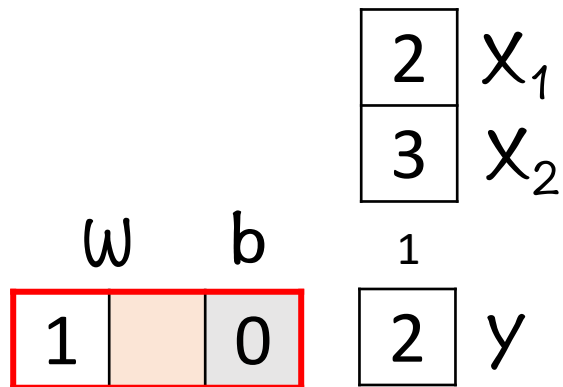
Linear Layer

Exercise 15



Linear Layer

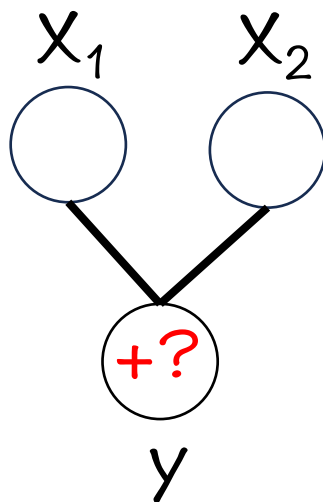
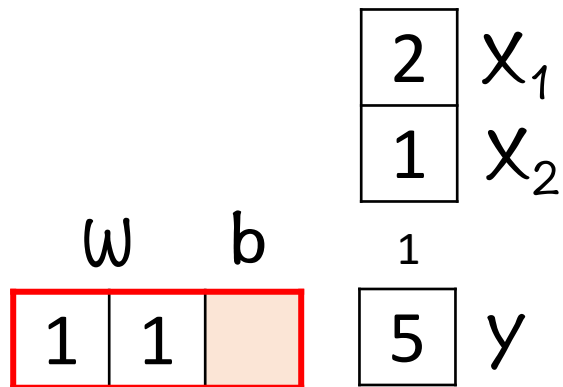
Exercise 16



0

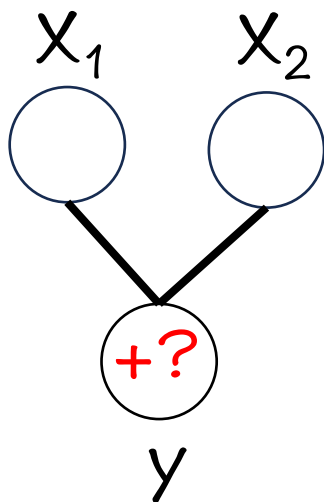
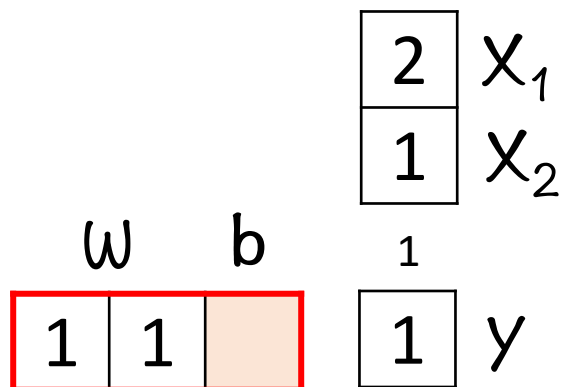
Linear Layer

Exercise 17



Linear Layer

Exercise 18



-2

Linear Layer

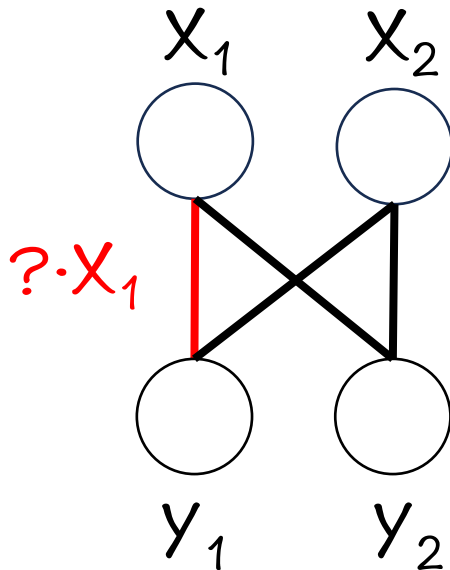
Exercise 19

Diagram illustrating the input layer structure. It shows a weight matrix w and a bias vector b .

	x_1	x_2
w	1	0
	1	-1

b	3	5
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The input vector x is represented by the values x_1 and x_2 . The output vector y is represented by the values y_1 and y_2 .

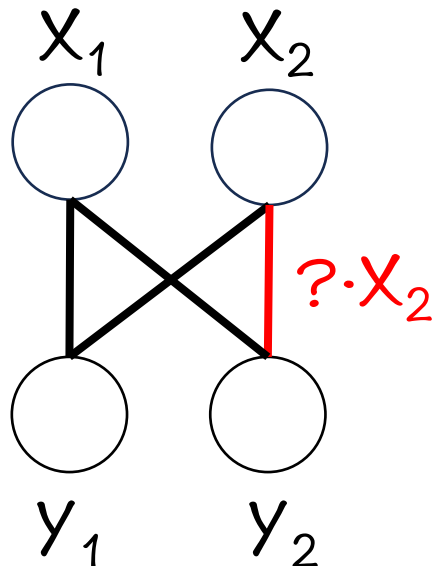


-1

Linear Layer

Exercise 20

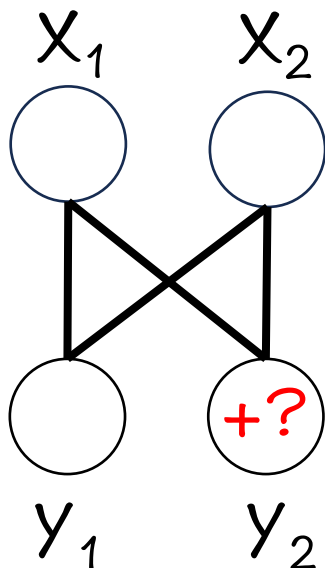
w			b			
1	2	0	1	4	x_1	
1		0		2	x_2	
				8	y_1	
				10	y_2	



Linear Layer

Exercise 21

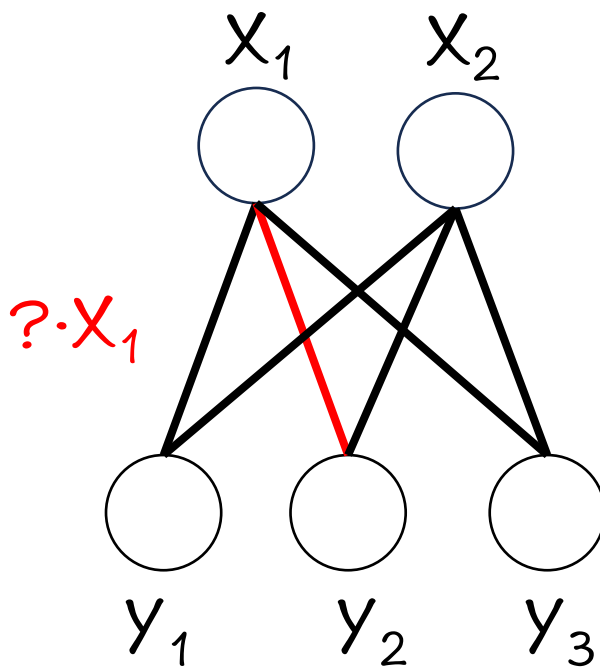
w			b		
1	2	1	1	3	x_1
1	2			2	x_2
				8	y_1
				12	y_2



Linear Layer

Exercise 22

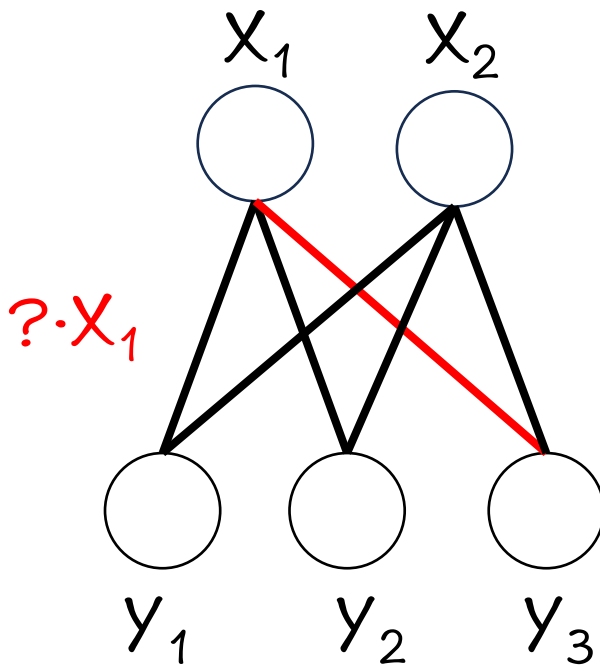
w			b		
1	1	0	3	x_1	
	1	0	2	x_2	
3	0	0	1		
			5	y_1	
			8	y_2	
			9	y_3	



Linear Layer

Exercise 23

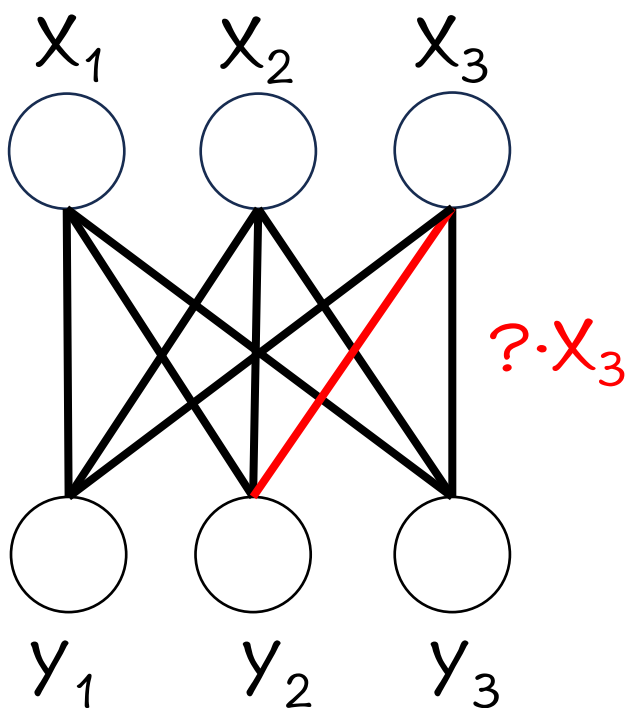
w			b		
1	1	0	2	x_1	
2	1	0	1	x_2	
	1	0	1		
			3	y_1	
			5	y_2	
			7	y_3	



Linear Layer

Exercise 24

				2	x_1
				1	x_2
				2	x_3
w		b		1	
1	1	0	0	3	y_1
1	1		0	1	y_2
1	1	1	0	5	y_3

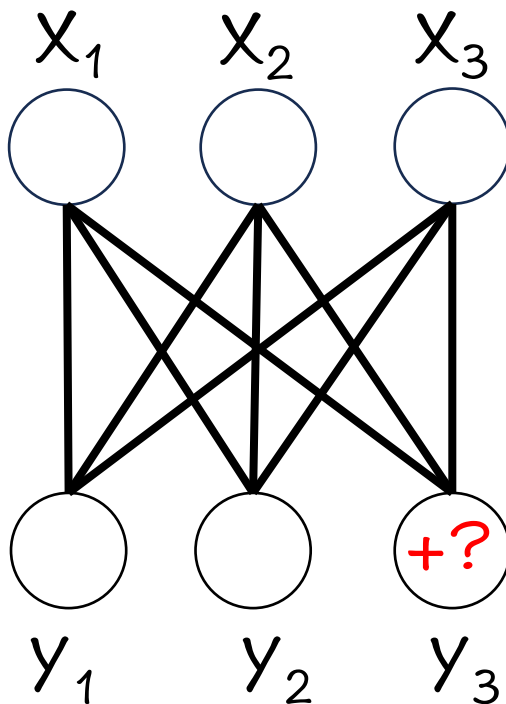


-1

Linear Layer

Exercise 25

				2	x_1
				5	x_2
				1	x_3
				1	
w		b		1	
1	1	0	0	7	y_1
1	1	0	-2	5	y_2
1	1	0		3	y_3



-4