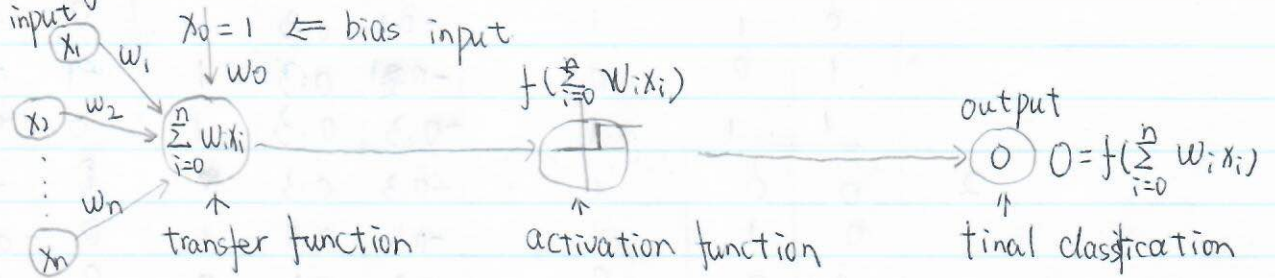


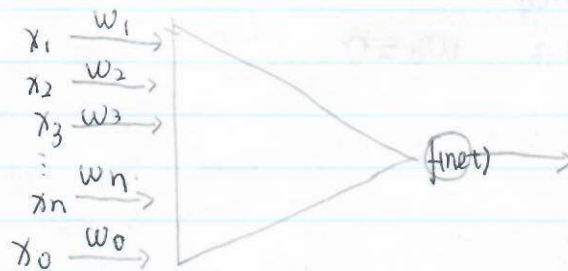
#### Project 4

① To design a perceptron with bias to learn simple logic operators

We get



To simplify.



②  $P \rightarrow Q$

We get the training data

P	Q	$P \rightarrow Q$
0	0	1
0	1	1
1	0	0
1	1	1

③ bias = 1     $w_0 = 0.2$   
learning rate = 0.2

Epoch	Input		Desired Output $Y_d$	Initial weights		Actual output $Y$	Error $e$	Final weight	
	$x_1$	$x_2$		$w_1$	$w_2$			$w_1$	$w_2$
1	0	0	1	-0.1	0.3	1	0	-0.1	0.3
	0	1	1	-0.1	0.3	1	0	-0.1	0.3
	1	0	0	-0.1	0.3	1	-1	-0.3	0.3
	1	1	1	-0.3	0.3	1	0	-0.3	0.3
2	0	0	1	-0.3	0.3	1	0	-0.3	0.3
	0	1	1	-0.3	0.3	1	0	-0.3	0.3
	1	0	0	-0.3	0.3	0	0	-0.3	0.3
	1	1	1	-0.3	0.3	1	0	-0.3	0.3

~~After~~ after learning

$$w_1 = -0.3 \quad w_2 = 0.3 \quad w_0 = 0$$