|  |  |  |
| --- | --- | --- |
| **X1** | **X2** | **XOR** |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

**XOR GATE USING PERCEPTRON**

*wo* + < 0

*wo* + ≥ 0

*wo* + ≥ 0

*wo* + ≤ 0

*w0*+ *w1* . 0 + *w2*. 0 < 0 => *w0* < 0

*w0*+ *w1* . 0 + *w2*. 1 ≥ 0 => *w0* ≥ *-w2*

*w0*+ *w1* . 1 + *w2*. 0 ≥ 0 => *w0* ≥ *-w1*

*w0*+ *w1* . 1 + *w2*. 1 ≥ 0 => *w0* ≤ *-w2 - w*1

On analysing the inequality *w0* ≤ *-w2 - w*1 is incorrect since if *w0* ≥ *-w2 and w0* ≥ *-w1* then their summation can’t be greater than *w0* .

Hence, mathematically the XOR gate isn’t linearly separable.

**Graphical Interpretation**

The line formed by joining co-ordinates (0,1) and (1,0) is the only region yielding the value ≥ 0 and on the either side of the region the values are ≤ 0. Hence, the XOR is not linearly separable.

Also, the threshold can’t be determined as there is criteria.