1a.

Truth table 1 for AND operation is

X1	X2	AND
0	0	0
0	1	0
1	0	0
1	1	1

1b.

The values of w1,w2 and b are
w1 = 1
W2 = 1
b = -1

The equation of y will be
y = Ø(x1 + x2 -1)

1c.

Truth table 2 for OR operation is

X1	X2	OR
0	0	0
0	1	1
1	0	1
1	1	1

1d.

The values of w1,w2 and b are
w1 = 1
W2 = 1
b = 0

The equation of y will be
y = Ø(x1 + x2)

1e.

Truth Table 3 for XOR Operation is

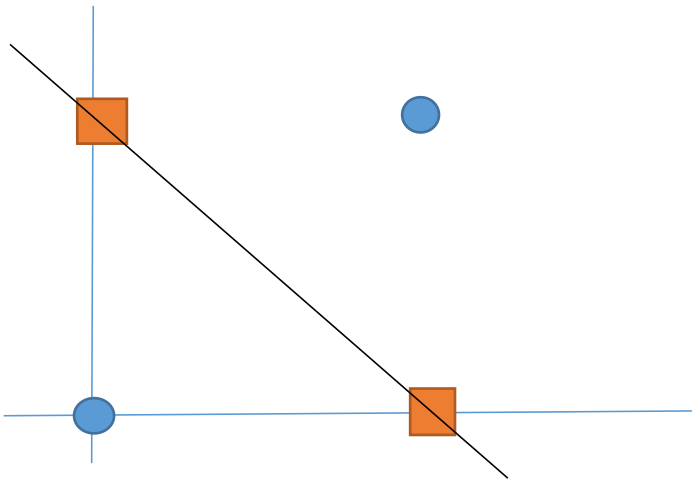
X1	X2	XOR
0	0	0
0	1	1
1	0	1
1	1	0

1f.

The linear separator depicted in figure 1 is given by the formula

y = Ø(x1 + x2 -1), this is failing to create an XOR function

If we draw a graph for XOR points we will be having something like



 = y = 0

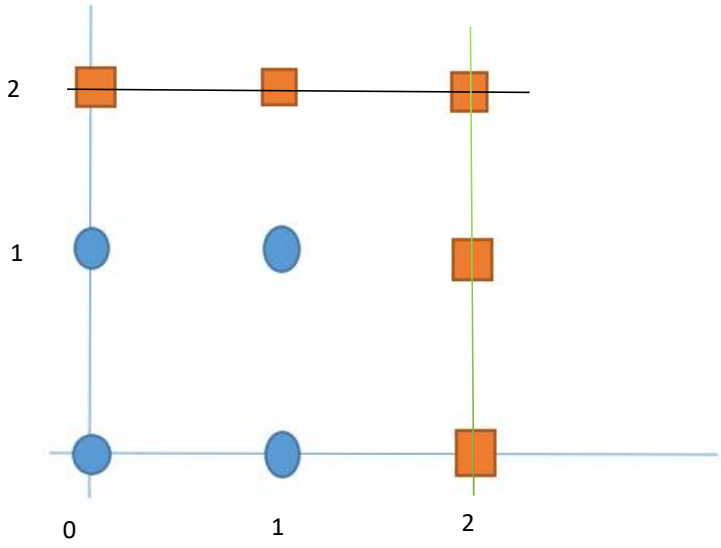
 = y =1

 = The linear separator for table 1

Clearly if we look at the graph we can say that XOR is not linearly separable and we cannot find a linearly separable equation for XOR operation. The equation given for Truth table 1 cannot be used to create logical XOR because for the case x = [1,1] we have y =1 where as we actually need to get y=0

1g.

The graph for the given question will be as follows



We can see from the graph clearly that this is not linearly separable. This function cannot be learned from a linear perceptron but it can be learned from a Multilayer perceptron.
Let there be two functions y1 and y2, representing the two linear perceptrons given in the graph.

y1 = Ø1 (x1 -2)
y2 = Ø1 (x2-2)

Where Ø1 (z) = $\begin{cases} 0 & if\ z < 0 \\ 1 & if\ z >= 0 \end{cases}$

Now the resultant y is OR of y1 and y2.

y = Ø (y1 + y2 -1)

Where Ø (z) = $\begin{cases} 0 & if\ z <= 0 \\ 1 & if\ z > 0 \end{cases}$

We get the desired output from the equation of y.

2.

The Accuracy Scores are as follows

```
Perceptron
Accuracy: 0.8004
F1-Score: 0.8330545332887253
Precision: 0.8311081441922563
Recall: 0.8350100603621731
Time taken for perceptron to execute training and classification: 0.8120155334472656
Time taken for our model implementation is approximately 1.18
```

The code is attached when submitting the assignment.