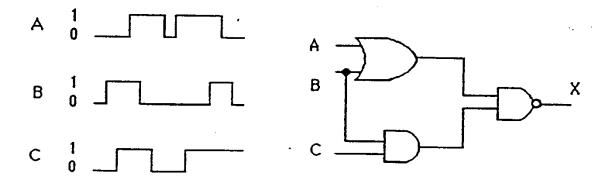
SC1005 Digital Logic Tutorial 2

Logic gates and Boolean algebra

- 1. From the following figure,
 - a) Express X as a Boolean function of inputs A, B and C.
 - b) Sketch the output waveform at point X.



- 2. A logic circuit's output expression is Y = [(A B' C) + D]'.
 - (a) Draw the logic circuit diagram for Y.
 - (b) Construct the truth table for the circuit.
- 3. Simplify the following expressions using Boolean algebra:
 - a) X = A'B'C'D' + A'B'CD' + A'BCD' + ABCD' + AB'CD'
 - b) X = [AB (C+D)'AB]'
 - c) X = A(AB)' + A'B'C + ABC
- 4. Show using Boolean algebra that the following equation is true.

$$AB + ABC'D + ABDE' + A'BC'E + A'B'C'E = AB + A'C'E$$

- 5. Implement the function (A+B)(C+D) using only
 - a) Two-input NAND gates
 - b) Two-input NOR gates

Answers

- 1. (a) X = [(A + B) B C]'
- 2. (b) There are 7 1's in the Y column of the truth table
- 3. a) X = A'B'D' + CD'
 - b) X = A' + B' + C+D
 - c) X = AB' + AC + B'C
- 5. a) 8 two-input NAND gates needed.
 - b) 3 two-input NOR gates needed.