Tutorial 3 - Questions (Part 1)

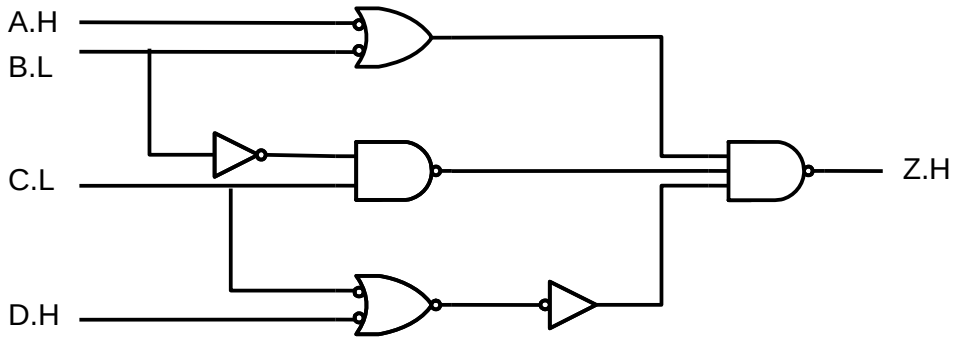
Logic gates

1. Use algebraic manipulation to find the MSOP for $f = x_1x_3 + x_1\overline{x_2} + \overline{x_1}x_2x_3 + \overline{x_1}\,\overline{x_2}\,\overline{x_3}$.

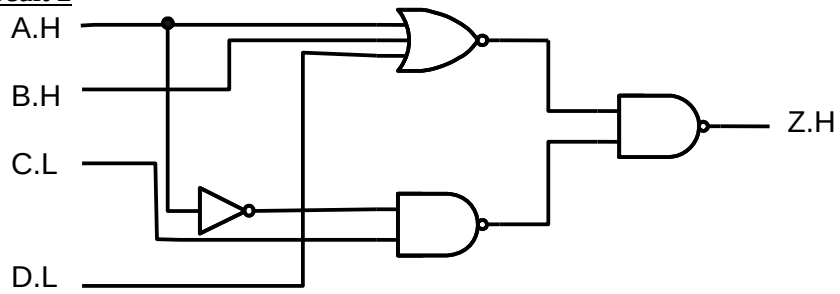
2. For circuits 1 and 2 below:

   (a) Fill in all the intermediate signal names using the positive logic convention
   (b) Find the logic expression for *Z* for the two cases.

Circuit 1



Circuit 2



3. Design a logic circuit using only NOR gates. Use alternate gate representation if necessary for clear circuit diagrams.

$$X = A \oplus B \oplus C$$

4. Design a circuit to realize $Z = \overline{A}B + \overline{B}\overline{C}D + \overline{B}\overline{D}$ in the positive logic convention. *A* and *B* are active low signals while *C*, *D* and *Z* are active high. Use a minimum number of gates, and draw clear circuit diagrams with alternate gate representations as required.