

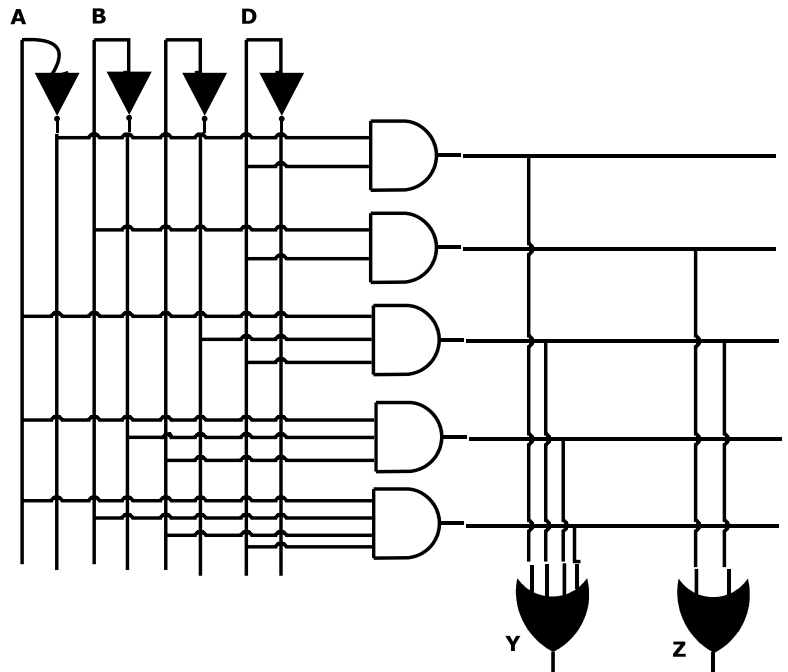
1. Simplify the following Boolean equations using Boolean theorems

$$\triangle Y = AC + \bar{A}\bar{B}C$$

$$\triangle Y = \bar{A}\bar{B} + \bar{A}B\bar{C} + (\bar{A} + \bar{C})$$

$$\triangle Y = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C\bar{D} + ABD + \bar{A}\bar{B}C\bar{D} + B\bar{C}\bar{D} + \bar{A}$$

- $\triangle$ Write Boolean equations for the circuit shown below. You need not minimize the equations.



2. A circuit has four inputs and two outputs. The inputs, A3:0, represent a number from 0 to 15. Output P should be TRUE if the number is prime (0 and 1 are not prime, but 2, 3, 5, and so on, are prime). Output D should be TRUE if the number is divisible by 3. Give simplified Boolean equations for each output and sketch a circuit.
3. Design a circuit that will tell whether a given month has 31 days in it. The month is specified by a 4-bit input, A3:0. For example, if the inputs are 0001, the month is January, and if the inputs are 1100, the month is December. The circuit output, Y, should be HIGH only when the month specified by the inputs has 31 days in it. Write the simplified equation, and draw the circuit diagram using a minimum number of gates. (Hint: Remember to take advantage of don't care.)
4. Find the sum-of-product function of $\triangle f(A, B, C) = A\bar{B} + C + \bar{A}$