ASHESI

Discrete Structures and Theory (Spring 2023)
Discussion 9
Date: 29/03/2023

Exercise 1:

Find the sum-of-products expansions of these Boolean functions. Use a truth table and then Boolean identities.

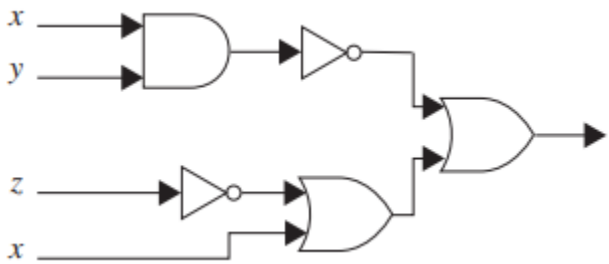
a) $F(x, y, z) = (x + z)y$
b) $F(x, y, z) = x$
c) $F(x, y, z) = x\,\bar{y}$

Exercise 2:

Read together the page on examples of circuits in Section 12.3 (Circuit for majority voting, circuit for a light controlled by two/three switches)

Exercise 3:

Find the output of the following circuit:



Exercise 4:

Construct circuits from inverters, AND gates, and OR gates to produce these outputs.

a) $\bar{x} + y$
b) $\overline{(x + y)}x$
c) $xyz + \bar{x}\,\bar{y}\,\bar{z}$
d) $\overline{(\bar{x} + z)(y + \bar{z})}$

Exercise 5:

Use a truth table to find the product-of-sums expansions of these Boolean functions.

a) $F(x, y, z) = x + y + z$
b) $F(x, y, z) = (x + z)y$
c) $F(x, y, z) = x$
d) $F(x, y, z) = x\,y$