Introduction to Computer Science
Jacobs University Bremen
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Module: CH-232
Date: 2021-10-22
Due: 2021-10-29

ICS 2021 Problem Sheet #7

Problem 7.1: *quine-mccluskey algorithm* (2+4+3+1 = 10 points)

Consider integer numbers in the range 0...63 that can be represented using six bits. The boolean function $F(X_5, X_4, X_3, X_2, X_1, X_0)$ is true when the number $(X_5X_4X_3X_2X_1X_0)_2$ is a Fibonacci number and false otherwise.

a) Provide a boolean expression in DNF defining the function F. What is the cost of the DNF expression?

b) Calculate the prime implicants of F.

c) Construct the prime implicant chart and identify the essential prime implicants. What is a minimal set of prime implicants covering the function F?

d) Write out a minimal boolean expression defining F using mathematical logic notation. What is the cost of the minimal boolean expression?

For calculating the cost of a boolean expression, we only consider logical $\wedge$ and $\vee$ operations.