

Homework 4

Max marks: 40

Due on Oct 1st, 2021, 9 AM, before class.

Problem 1 *Hazard problem: Design a hazard free SOP for $f(A, B, C, D) = \sum m(0, 1, 4, 5, 6, 7, 9, 11, 14, 15)$*

Problem 2 *Find the simplest realization of the function $f(x_1, \dots, x_4) = \sum m(0, 3, 4, 7, 9, 10, 13, 14)$, assuming that the logic gates have a maximum fan-in of two.*

Problem 3 *Find the minimum-cost circuit for the function $f(x_1, \dots, x_4) = \sum m(0, 4, 8, 13, 14, 15)$. Assume that the input variables are available in uncomplemented form only. (Hint: Use functional decomposition.)*

Problem 4 *Use functional decomposition to find the best implementation of the function $f(x_1, \dots, x_5) = \sum m(1, 2, 7, 9, 10, 18, 19, 25, 31) + D(0, 15, 20, 26)$. How does your implementation compare with the lowest-cost SOP implementation? Give the costs.*