Exercise 1 Specification and realization of stream processing functions

(a) Model a component that combines two input streams of natural numbers and outputs the merged stream. Is there another variant of this implementation?

(b) Apply the above component to the input streams - (5, 2, 10) and (3, 100)

(c) Model a component that takes as input two sorted streams of natural numbers, and as an output gives a merged sorted stream.

(d) Apply the above component to the input streams - (1, 5, 10) and (2, 4, 25)

Exercise 2 Composition of stream processing functions

(a) Model an identity function, $id$, duplicating its input as output, and an adder function, $add$, with two identical outputs.

(b) (Homework) Consider the composition of $id$ and $add$, as shown in Fig. 1. What is the output for this composition in case of input streams - (1, 1, 1, 1, 1)?

Exercise 3 Process algebra

(a) Define a process term for a process that continuously receives a (uninterrupted) signal and resends in turn, until stopped by a dedicated $Halt$ signal. What is its alphabet?

(b) (Homework) Turn the above process into an unreliable medium. (Non-deterministic)