

Specification and Verification II

The following is an informal specification of a device \( D \)

\[ D \text{ has a 1-bit input } \text{in}, \text{ a 1-bit input } \text{select} \text{ and a 4-bit output } \text{out}. \text{ The value at } \text{out} \text{ is } 0000 \text{ if } \text{select} \text{ is 0 and is a word consisting of the values input at } \text{in} \text{ at the four preceding cycles if } \text{select} \text{ is 1.} \]

\((a)\) Formalise this informal specification and point out how you have resolved any ambiguities and incompletenesses. \([8 \text{ marks}]\)

\((b)\) Using 1-bit unit-delay elements and multiplexers, design a device that implements your formal specification. Draw a diagram of your design. \([8 \text{ marks}]\)

\((c)\) Outline how you would go about trying to formally verify your design. \([4 \text{ marks}]\)