Specification and Verification II

Describe the technique of exhaustive enumeration and discuss its rôle in formal proofs of correctness. [5 marks]

The non-equality of two boolean streams, a and b, is defined as follows:

\[
\begin{align*}
(\text{NotEqual } 0 (a, b) &= F) \land \\
(\text{NotEqual}(t+1) (a, b) &= (\neg(a \ t = b \ t) \rightarrow T \mid \text{NotEqual } t (a, b)))
\end{align*}
\]

Using basic gates and a register with the following behaviour

\[
\text{REG(in,out)} = (\forall t. \text{out } t = ((t = 0) \rightarrow F \mid \text{in}(t - 1)))
\]

device and verify a circuit with inputs a and b and an output, out, which satisfies the following behaviour: \( \forall t. \text{out } t = \text{NotEqual } t (a, b) \) [15 marks]