Specification and Verification II

(a) Specify a combinational device MAX with two 4-bit inputs $i_1, i_2$ and a 4-bit output $o$, such that the value output on $o$ is the input that has the greater value when interpreted as a binary number. [2 marks]

(b) Specify a sequential device REG($w$) with a 4-bit input $i$ and output $o$ such that on the first cycle (cycle 0) $w$ is output on $o$ and on cycle $n$ ($n > 0$) the value input on the preceding cycle is output. [2 marks]

(c) Write a specification of a device $D_{max}$ with a 4-bit input $i$ and a 4-bit output $o$ such that the value output on $o$ on the $n$-th cycle is the maximum value input on $i$ on all cycles up to and including the $n$-th cycle. [4 marks]

(d) Devise a circuit built out of MAX and REG that implements your specification. [4 marks]

(e) Outline how to prove that your circuit meets your specification. [8 marks]