Custom Computing: Assessed Coursework

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Question 1

Recurring engin eering costs are the costs that will occur in a repeating fashion during the production, usually involving fabriction. These costs are usually descriped in a per unit form.

Non-recurring engineering cost is the one-time up-front cost for research, design, testing and development of a new product.

As we can see below, the minimum number of units that need to be sold for the ASIC implementation to be cost-effective is 1 million units.

$C_{FPGA} > C_{ASIC} \Rightarrow £2 \times N_{units} > £10^6 + £1 \times N_{units} \Rightarrow N_{units} > 10^6$

Question 2

(a) Symbolic Simulation

Q1

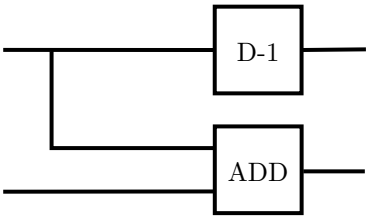

Figure 1: the circuit derrived for Q1

P1

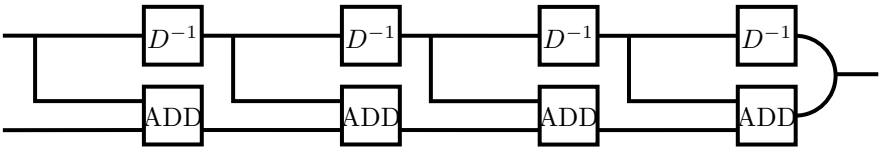

Figure 2: the circuit derrived for P1

Question 3

(a) Proof by induction

In order to show that $[P, Q]^n; R = R; Q^n$ for $n > 0$, we first have to show that it is $True$ for n = 1.

Base case: $[P, Q]^1; R = R; Q^1$

This is intuitively shown to be true by the given assumption $[P, Q]^n; R$ which is equivalent.

Assuming that it is also true for $n = k > 0$

$[P, Q]^k; R = R; Q^k$

We need to show that the same is true for $n = k + 1$

$[P, Q]^{k+1}; R$
$= [P, Q]^k; [P, Q]; R$
$= [P, Q]^k; R; Q$
$= R; Q^k; Q$
$= R; Q^{k+1}$

So by induction we have proved that if we know $[P, Q]; R = R; Q$ to be $True$, for $n > 0$:

$[P, Q]^n; R = R; Q^n$ is also $True$

Question 4