

Introduction to Computer Engineering (E85)

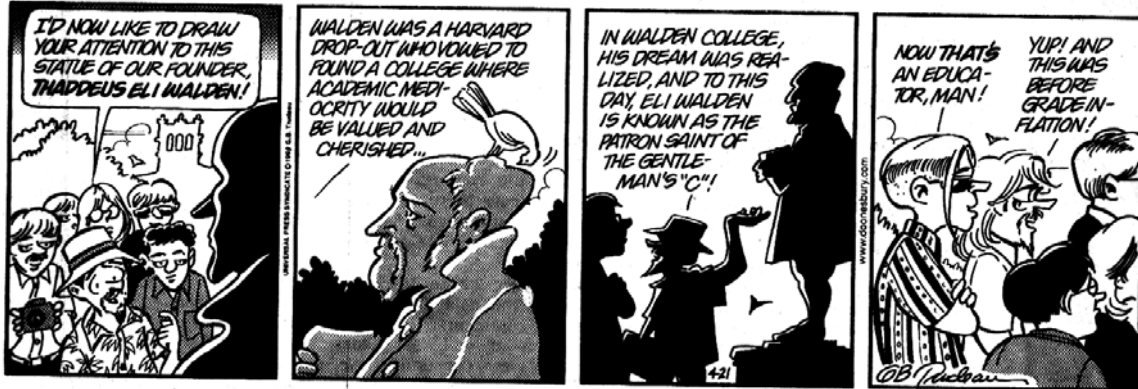
Harris

Fall 2010

Problem Set 4

Due: Wednesday, September 29

DOONESBURY By Garry Trudeau



1) Textbook Problems

Do problems 3.34, 3.35, 4.2, and 4.18.

2) Blocking and nonblocking assignments

The lecture described a bad synchronizer built using blocking assignments that implies one flip-flop instead of two.

```
// Bad synchronizer using
// blocking assignments
module syncbad(input logic clk,
               input logic d,
               output logic q);
    logic n1;

    always_ff @(posedge clk)
    begin
        n1 = d; // blocking
        q = n1; // blocking
    end
endmodule
```

- Show a different way of writing the always statement that still uses blocking assignments but implies a correct synchronizer.
- Describe a simple sequential circuit that cannot be correctly described with blocking assignments no matter how you write them.

3) Time

Please indicate how many hours you spent on this problem set. This will not affect your grade, but will be helpful for calibrating the workload for next semester's class.