Introduction to Computer Engineering (E85)
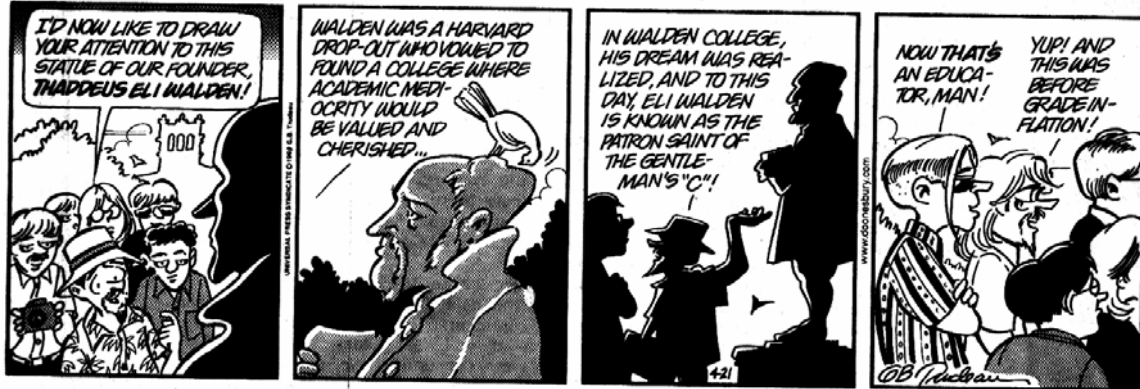
Harris   Fall 2007

Problem Set 4   **Due: Wednesday, October 3**

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      clk,
               input      d,
               output reg q);
  reg n1;
  always @(posedge clk)
    begin
      n1 = d;  // blocking
      q  = n1; // blocking
    end
endmodule
```

(a) Show a different way of writing the always statement that still uses blocking assignments but implies a correct synchronizer.

(b) 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.