Homework 03
ECE 587, Spring 2015

Due Date: 5:00pm 4/29 Chicago time

1. (40 points) Consider the following sequential program (the same as our HLS example discussed in Lecture 21) that should be implemented as a hardware component.

inputs/outputs: u,w,y,dx,i
temporary variables: u1,u2,u3,u4,u5,u6,y1

u1 = u*dx;
u2 = 5*w;
u3 = 3*y;
y1 = i*dx;
w = w+dx;
u4 = u1*u2;
u5 = dx*u3;
y = y+y1;
u6 = u-u4;
u = u6-u5;

1) Assume each multiplication takes 4 clock cycles and each addition or subtraction takes 1 clock cycle. Compute the ASAP schedule to determine the minimum execution time.

2) Compute the ALAP schedule based on the minimum execution time.

3) Assume there are one 2-input multiplier, which is pipelined into 4 stages, and one 2-input adder/subtractor, which is not pipelined. Perform a resource-constrained scheduling using the mobility computed from the results of 1) and 2).

4) Determine variable lifetimes and bind variables to as few registers as possible. (Note: you don’t need to consider connection cost.)