17-363/17-663: Programming Language Pragmatics, In-Class Exercises   November 17, 2022

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1. [Instruction Scheduling]. Assume the following program is going to be run on a platform where multiplication and division take 4 cycles and all other operations take one cycle. How many cycles will this take as written? Perform list scheduling and show the results. How many cycles will it take after optimization?

a := x * 37

b := a / 3

c := a + b

i := y >> 2

h := i - 1

g := h << 2

f := h + i

e := f - g

d := c + e

2. [Register Allocation]. Apply Chaitin's register allocation and spilling algorithm, using graph coloring to allocate 4 registers. Give your answer by assigning a register number 1-4 to each of the variables above, and assign no register if the variable is spilled to memory.