

LAST NAME:

FIRST NAME:

RECITATION: A1: Th 4-4.50pm

PERSON # :

A2: Wed 1-1.50pm

CSE341 – COMPUTER ORGANIZATION – SPRING 2018 Homework 7 A4: Th 3-3.50pm

Due: April 9, 2018 10:00am (Mark your recitation on the right side) A5: Wed 8-8.50am

1. Mark the Data Hazards in the following instruction sequence, for MIPS 5 stage pipelined datapath.

ADD \$6, \$6, \$4
LW \$2, 0(\$3)
AND \$16, \$2, \$4
OR \$8, \$6, \$2
SUB \$10, \$16, \$6
ADD \$6, \$8, \$2

2. In a basic 5-stage MIPS pipeline with the following instruction sequence

OR r1,r2,r3

OR r2,r1,r4

OR r1,r1,r2

- i. Indicate dependences (data hazards).

- ii. Assume there is no forwarding in this pipelined processor, add NOP instructions to eliminate data hazards as needed.

- iii. Assume there is full forwarding. Indicate hazards and add NOP instructions to eliminate them

LAST NAME:

FIRST NAME:

RECITATION: A1: Th 4-4.50pm

PERSON # :

A2: Wed 1-1.50pm

CSE341 – COMPUTER ORGANIZATION – SPRING 2018 Homework 7 A4: Th 3-3.50pm

Due: April 9, 2018 10:00am (Mark your recitation on the right side) A5: Wed 8-8.50am

3. The following sequence of instructions is executed on a 5-stage pipelined datapath:

add r5,r2,r1

lw r3,4(r5)

lw r2,0(r2)

or r3,r5,r3

sw r3,0(r5)

i. Indicate dependences (data hazards).

ii. If there is no forwarding or hazard detection, insert NOPs to ensure correct execution.

iii. Use a combination of instruction reordering and forwarding (only when needed if reordering is not enough) to fix the data hazards if possible; beyond this, if NOPs (stall) are needed use them.