North American University

COMP 2316 – Computer Organization – Sample Questions For Final Exam

Name

Last Name

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| --- | --- | --- |
| Question | Max grade | Grade |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| … |  |  |
| Total | 100 |  |

Rules:

* Questions worth 105 points, if a student gets more than 100 pts, it will be normalized to 100 pts.
* Nobody can enter 25 minutes after the exam starts. Nobody can leave within 30 minutes after the exam starts.
* There will be a sign‐in sheet, you have to sign in
* You cannot use extra paper. You can bring 3 pages of cheat sheet.
* Minimum punishment for cheating is getting ‐20 pts out of 100 from this final
* After the papers are distributed you cannot move to another seat before instructor’s permission
* No electronics (headphones, cell phones, you cannot listen music, watch movie or cartoon during your final exam!) except calculator
* Cell phones must be turned off all the time.

1. Indicate whether the statement is true(T) or false (F). (1pt for each correct answer, 20 questions, \_\_ pts max)
2. What are the flaws of using \_\_\_ metric
3. A program is compiled to run on a computer and the compiler generates one million one-cycle instructions and three million two-cycle instructions. If we assume that the cycle time is 10 ns, calculate the MIPS.(8pt)

1. For the following set of consecutive instructions, Assuming four stages of pipelining ( IF, OF, OE, OS), each stage takes one cycle, with the given line numbers
   1. ADD R1, R3, R2
   2. MUL R4, R3, R1
   3. ADD R5, R5, R6
   4. SUB R1, R3, R2
   5. ADD R3, R4, R5
2. Which instructions would cause RAW hazard? (Just give line numbers)(4pts)

1. How many cycles would it take to complete? (Also show stages in the table) (4pts)

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| **Cycles** | | | | | | | | | | | | | | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Instructions | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. With internal forwarding how many cycles would it take to complete? (Also show stages in the table) (4pts)

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| **Cycles** | | | | | | | | | | | | | | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Instructions | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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1. The following code fragment is expressed in arm assembly code. Fill in the blanks, so that It is equivalent to the following C code.

int counter;

int sum =0;

for (counter ==10; counter > 0; counter-- )

sum =sum + counter;

Fill in the blanks in the following code:

MOV r0,#10 ;Loop counter – ten times round the loop

MOV r1,#0 ;Clear sum in r1

Next \_\_\_\_\_\_\_\_\_\_\_ ;add loop counter to total

\_\_\_\_\_\_\_\_\_\_\_ ;decrement loop counter

BNE \_\_\_\_\_\_\_ ;continue until all done

1. A computer has three ten‐element vectors in memory, Va, Vb, and Vc. Each element of a vector is a 32‐bit word. Fill in the flowing code fragment to calculate all elements of Vc if the *i*th element is given by:

Vci = 2\*(Vbi - Vai)

AREA Operation, CODE, READWRITE

ADR r0,Va ;r0 pointer to array Va

ADR r1,Vb ;r1 pointer to array Vb

\_\_\_\_\_\_\_\_ ;r2 pointer to array Vc

\_\_\_\_\_\_\_\_ ;r3 contains the size of the array

Repeat LDR r5,[r0],#4 ;Repeat Get Va\_i

\_\_\_\_\_\_\_\_\_\_\_ ; Get Vb\_i

\_\_\_\_\_\_\_\_\_\_\_ ;Calculate Vb\_i – Va\_i

MOV r5,r5,\_\_\_\_\_\_\_ ; Calculate 2 \*(Vb\_i - Va\_i)

STR r5,[r2],#4! ; save result

SUBs r3,r3,#1 ; decrement counter by 1

BNE \_\_\_\_\_\_\_\_\_; Until all done

Va DCD 1,2,3,4,5,6,7,8,9,A

Vb DCD 2,3,4,5,6,7,8,9,A,B

Vc DCD 0,0,0,0,0,0,0,0,0,0

END

1. Fill in the function (Func1) in the following ARM code, so that it evaluates

If x > 0 then x = 2\*x+1 else x = 4\*x

AREA AutoIndex, CODE, READWRITE

ENTRY

MOV r0, #0x00000003

BL Func1

MOV r0, #0xFFFFFFFF

BL Func1

MOV r0, #0x0

Func1 CMP \_\_\_\_\_\_\_ \_

MOVGT \_\_\_\_\_\_\_\_

ADDGT \_\_\_\_\_\_\_\_

MOVLE \_\_\_\_\_\_\_\_

MOV \_\_\_\_\_\_\_\_\_

END