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Homework 5

**1h.**

lb $s3, 100($a0)

opcode [6 bits]: 32 = 100000

rs [5 bits]: $a0 = 4 = 00100

rt [5 bits]: $s3 = 19 = 10011

imm [16 bits]: 100 = 0000000001100100

Binary Encoding: 1000\_0000\_1001\_0011\_0000\_0000\_0110\_0100

Hex Encoding: 0x80930064

**1i.**

addi $sp, $sp, -32

opcode [6 bits]: 8 = 001000

rs [5 bits]: sp = 29 = 11101

rt [5 bits]: sp = 29 = 11101

imm [16 bits]: -32 = 0100000 -> 1011111 -> 1100000 -> 1111111111100000

Binary Encoding: 0010\_0011\_1011\_1101\_1111\_1111\_1110\_0000

Hex Encoding: 0x23bdffe0

**2h.**

Hex Encoding: A5583BC9

Binary Encoding: 1010\_0101\_0101\_1000\_0011\_1011\_1100\_1001

opcode: 101001 = 32+8+1 = 41 = sh

I format: 101001\_01010\_11000\_0011101111001001

rs: 01010 = 2+8 = 10 = $t2

rt: 11000 = 8+16 = 24 = $t8

imm: 0011101111001001 = 2^0+2^3+2^6+2^7+2^8+2^9+2^11+2^12+2^13

so imm = 1+8+64+128+256+512+2048+4096+8192 = 15305

Command:

sh $t8, 15305

**2i.**

Hex Encoding: 020B0823

Binary Encoding: 0000\_0010\_0000\_1011\_0000\_1000\_0010\_0011

opcode[6 bits]: 000000

R-format: 000000\_10000\_01011\_00001\_00000\_100011

rs [5 bits]: 10000 = 16 = $s0

rt [5 bits]: 01011 = 11 = $t3

rd [5 bits]: 00001 = 1 = $at

shamt [5 bits]: 00000 = 0

funct [6 bits]: 100011 = 35 = subu

Command:

subu $at, $s0, $t3

**3e.**

\* $t0 in instruction2 is dependent on instruction1

\* $t1 in instruction4 is dependent on instruction2

\* $t2 in instruction4 is dependent on instruction3

**3f.**

\* $s2 in instruction3 is dependent on instruction1

\* $s5 in instruction3 is dependent on instruction2

\* $s6 in instruction4 is dependent on instruction3

**4d.**

int problemPartD() {

int i = 0;

while (1) {

int returnVal = getAValue();

if (returnVal == 0) {

break;

}

i = i + returnVal;

}

return i;

}