

CSE 378  
Spring '09  
HW 1 Solution

## Paper & Pencil

1. *Disassemble these 4 MIPS instructions*

```
0000 0000 1000 0101 0001 0000 0010 0000
0000 0000 1100 0111 0001 1000 0010 0000
0000 0000 0110 0010 0001 1000 0010 0010
0000 0000 0000 0011 0001 1000 1000 0011
```

```
000000 00100 00101 00010 00000 100000
special rs    rt    rd          add ( $rd = rs + rt$ )
add $2, $4, $5
```

```
000000 00110 00111 00011 00000 100000
special rs    rt    rd          add ( $rd = rs + rt$ )
add $3, $7, $6
```

```
000000 00011 00010 00011 00000 100010
special rs    rt    rd          sub ( $rd = rs - rt$ )
sub $3, $3, $2
```

```
000000 00000 00011 00011 00010 000011
special      rt    rd    sa    sra ( $rd = rt \gg sa$ )
sra $3, $3, 2
```

**Note:** Cebollita comes with a disassembler (a converter from hex into assembly language). See the end of the “Compiler, Assembler, Linker, Utilities” page.

2. Convert the instructions into hex

```
00000000 10000101 00010000 00100000
0x00      0x85      0x10      0x20
0x00851020
```

```
00000000 11000111 00011000 00100000
0x00      0xC7      0x18      0x20
0x00C71820
```

```
00000000 01100010 00011000 00100010
0x00      0x62      0x18      0x22
0x00621822
```

```
00000000 00000011 00011000 10000011
0x00      0x03      0x18      0x83
0x00031883
```

3. Write the instructions as an easy-for-humans-to-read expression

**\$3 = ((\$7 + \$6) - (\$4 + \$5)) / 4**

## Cebollita Setup

*Put the most negative possible 32-bit(2's complement) number into register 10*

**One possible solution**

```
.text
.global __start
__start:
    addi $10, $0, 1
    sll $10, $10, 31
# We stop writing code here. That's a bug – the CPU continues on.
```