

Comp 120 Computer Organization
Spring 2005

Solutions to Problem Set #6

Problem 1. “Compiler Appreciation” [30 points]

(A) #assume address of y in \$t3

```
lw $t0,x
lw $t1, f
mul $t2, $t1, $t0
addi $t2, $t2, -1
sw $t2, $t3
```

(B) #assume memory

```
0: row
4: col
8: dst
1000: src
```

```
lw $t0, row
lw $t1, col
multi $t2, $t0, 32
add $t3, $t2, $t1
lw $t4, 1000($t3)
sw $t4, 8($t3)
```

(C) #assume address of abs in \$t1

```
lw $t0,x
slti $t2, $t0, 1
beq $t2, $zero, end
sub $t3, $zero, $t0
move $t0,$t3
```

end:

```
sw $t0, $t1
```

(D) #assume memory

```
0: j
4: n
8: a
```

```
lw $t0,j
sw $zero, $t0
```

```

    lw $t1, n
while:
    slt $t4, $t0, $t1
    beq $t4, $zero, end
    multi $t2, $t0, 2
    addi $t3, $t2, 1
    la $t2, a
    sw $t3, $t0($t2)
    addi $t0, $t0, 1
    j while
end:

```

(E) #assume memory

```

0: x
4: a

```

```

#assume $t2=4
lw $t0, x
lw $t1, $t0($t2) #a[x]
lw $t3, $t1($t2) #a[a[x]]
lw $t3, $t3($t2) #a[a[a[x]]]
sw $t3, $t1($t2) #a[a[x]]=a[a[a[x]]]

```

Problem 2. “Faking It” [30 points]

- (A) addu rA, rB, \$zero (not unique)
- (B) sub rA, \$zero, rB (not unique)
- (C) nor rA, rB, \$zero (not unique)
- (D) sltiu rA, rB, 1 (unique)
- (E) slti rd, rs, 1 (unique)

Problem 3. "MIPS Datapath" [40 points]

Opcode	PCSEL	RGEN	SEXT	BSEL	WDSEL	ALUFN				Wr	WERF	ASEL	LSEL
						Sub	Bool	Shft	Math				
sub	0	0X	X	0	1	1	XX	0	1	0	1	0	X
sll	0	0X	X	0	1	X	1	1	0	0	1	1	0
andi	0	0x	1	1	1	X	1	0	0	0	1	0	X
lw	0	0x	1	1	2	0	XX	0	1	0	1	0	X
sw	0	0x	1	1	X	0	XX	0	1	1	0	0	X
j	2	0x	1	1	X	X	XX	X	X	0	0	0	X
jal	2	0x	1	1	0	X	XX	X	X	0	1	0	X
lui	0	0x	1	1	1	X	00	1	0	0	1	1	1