

2.20) 1. srl \$t0, \$t0, 11

|||| |||| |||| |||X xxxx x||| |||| ||||  
↓  
0000 0000 0001 |||| |||| |||| |||X |||X

2. sll \$t0, \$t0, 26

0000 0000 0001 |||| |||| |||| ||xx xxxx  
↓  
xxxx xx00 0000 0000 0000 0000 0000 0000

3. sll \$t1, \$t1, 6

4. srl \$t1, \$t1, 6 } give

0000 0011 |||| |||| |||| |||| |||| ||||

5. add \$t1, \$t0, \$t1

xxxx xx00 0000 0000 0000 0000 0000 0000  
+ 0000 0011 |||| |||| |||| |||| |||| ||||  
-----  
xxxx xx11 |||| |||| |||| |||| |||| ||||

1	srl	\$t0, \$t0, 11
2	sll	\$t0, \$t0, 26
3	sll	\$t1, \$t1, 6
4	srl	\$t1, \$t1, 6
5	add	\$t1, \$t0, \$t1

ANS

2.25) a) I-type is most appropriate because I-type includes 16 bits for address, which is required for handling the loop address.

b) 

```
loop: blez $t2, next
      addi $t2, $t2, -1
      j    loop
next:
```

- 2.26) a)
- 1 -  $\$t1 = 10$   $\$t2 = 1$   $\$t1 = 9$   $\$s2 = 2$
  - 2 -  $\$t1 = 9$   $\$t2 = 1$   $\$t1 = 8$   $\$s2 = 4$
  - 3 -
  - 4 -
  - 5 -
  - 6 -
  - 7 -
  - 8 -
  - 9 -
  - 10 -  $\$t1 = 1$   $\$t2 = 1$   $\$t1 = 0$   $\$s2 = 20$
  - 11 -  $\$t1 = 0$   $\$t2 = 0 \rightarrow \text{DONE}$

$\$s2 = 20$

ANS

b)

```
while (i > 0) {
    i = i - 1
    B = B + 2
}
```

ANS

- c) The final iteration only executes 2 instructions, while all others execute 5. Thus the answer is  $5N + 2$

$5N + 2$

ANS



abs \$s4, \$s7

1. sra \$t0, \$s7, 31

Sign bit is shifted in, so \$t0 will be 0x0 if positive and 0xFFFFFFFF if negative.

2. xor \$s7, \$s7, \$t0

ex1.  $S = 00000101$      $\$t0 = 00000000 \Rightarrow 00000101$   
 $\$s7 = 00000101$

ex2.  $-S = 11111011$      $\$t0 = 11111111 \Rightarrow 00000100$   
 $\$s7 = 11111011$

3. sub \$s4, \$s7, \$t0

ex1.  $00000101 - 00000000 = 00000101 = S$

ex2.  $00000100 - 11111111$   
 $= 00000100 + 00000001 = 00000101 = S$

sra \$t0, \$s7, 31  
xor \$s7, \$s7, \$t0  
sub \$s4, \$s7, \$t0

ANS

SL

rol \$t4, \$t3, 12

1. sll \$t0, \$t3, 12

xxxx xxxx xxxx | | | | |  
 ↓  
 | | | | | 0 0 0

2. srl \$t3, \$t3, 20

xxxx xxxx xxxx | | | | |  
 ↓  
 0 0 0 0 0 xxxx xxxx xxxx

3. \$t0 = | | | | | 0 0 0  
 \$t3 = 0 0 0 0 0 xxxx xxxx xxxx

or \$t3, \$t3, \$t0

\$t3 = | | | | | xxxx xxxx xxxx

sll \$t0, \$t3, 12  
 srl \$t3, \$t3, 20  
 or \$t3, \$t3, \$t0

ANS

se

1d \$+6, 0(\$54)

1w \$+6, 0(\$54)
1w \$+7, 4(\$54)

ANS