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ITCS 3181 Homework 2

1. (12\*(1.4\*10^9)) / (12.5\*10^6) = 1344 CPI
2. (0.25\*1.4) + (0.7\*2.4) + (0.05\*2) = 2.13
3. (1.9 / Clock Rate A) = (1.1\*(1-0.2)) / (800\*10^6)

Clock Rate of A needs to be 1.7 GHz

1. CPI 1 = (1.4\*0.25) + (2.4\*0.7) + (2\*0.05) = 1.85

CPI 2 = (1.4\*0.25) + ((2.4/2)\*0.7) + (2\*0.05) = 1.29

CPI 2 is the preferable enhancement

1. M1 CPI = (0.6\*1 + 0.3\*2 + 0.1\*4) = 1.6

M2 CPI = (0.6\*2 + 0.3\*3 + 0.1\*4) = 2.5

1. main:

addi x5, x0, 0

addi x6, x0, 0

loop:

slli x30, x5, 2

add x30, x22, x30

ld x30, 0(x30)

beq x30, x0, exit

add x6, x6, x30

addi x5, x5, 1

j loop

exit:

1. main:

addi x5, x0, 0

loop:  
beq x5, x6, exit   
sll x30, x5, 2   
add x30, x30, x7   
ld x31, 0(x30)   
add x31, x31, x5   
sd x31, 0(x30)   
addi x5, x5, 1

j loop   
exit:

1. li x5, 10

sw x5, a

li x5, 25

sw x5, val

lw rs1, a

li rs2, 0  
bre rs1, rs2, next  
lw rs2, val  
andi rs2, 0xFFFF  
mul rs2, 16  
sw rs2, val  
lw rs2, val  
srli rs2, 16  
addi rs2, 10  
sw rs2, val

1. lw x5

lw x6

sub x7, x5, x6

beq equal

bge greater

blt lesser

equal:

lui x7, 0

sw x7, c

b end

greater:

lui x7, 3

sw x7, c

b end

lesser:

lui x7, 1

sw x7, c

end:

1. 1. 00011111 -> invert = 11100000 -> 2’s compliment = 11100001
   2. 00000001 -> invert = 11111110 -> 2’s compliment = 11111111
   3. 00011011 -> invert = 11100100 -> 2’s compliment = 11100101
   4. 01000101 -> invert = 10111010 -> 2’s compliment = 10111011
   5. 15 = 00001111

16 = 00010000 -> invert = 11101111 -> 11101111 + 1 = 11110000

00001111 + 11110000 = 11111111

* 1. 0011 + 1101 = 10000 drop 1 to keep 4 bit = 0000
  2. 15 = 00001111 -> invert = 11110000 -> 11110000 + 1 = 11110001

16 = 00010000 -> invert = 11101111 -> 11101111 + 1 = 11110000

11110001 + 11110000 = 11100001

* 1. 1101 -> invert = 0010 -> 0010 + 1 = 0011

0011 + 0011 = 0110

1. 1. 0001 only both with 1 will be 1
   2. 0110 change to other value
   3. 0101 -> invert = 1010 -> 1010 + 1 = 1011
   4. 0100 move to right 1
   5. 1101 either with 1 will be 1
   6. 1100 must only have one 1 not both
   7. 0100 move to left 2