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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
4. 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
5. 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
6. 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:
```

7. 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:

8. 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
```

9.
```
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:
```

10.

a. 00011111 -> invert = 11100000 -> 2’s compliment = 11100001

b. 00000001 -> invert = 11111110 -> 2’s compliment = 11111111

c. 00011011 -> invert = 11100100 -> 2’s compliment = 11100101

d. 01000101 -> invert = 10111010 -> 2’s compliment = 10111011

11.

a. 15 = 00001111

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

00001111 + 11110000 = 11111111

b. 0011 + 1101 = 10000 drop 1 to keep 4 bit = 0000

c. 15 = 00001111 -> invert = 11110000 -> 11110000 + 1 = 11110001

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

11110001 + 11110000 = 11100001

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

0011 + 0011 = 0110

12.

a. 0001 only both with 1 will be 1

b. 0110 change to other value

c. 0101 -> invert = 1010 -> 1010 + 1 = 1011

d. 0100 move to right 1

e. 1101 either with 1 will be 1

f. 1100 must only have one 1 not both

g. 0100 move to left 2